

# DRAGON USER

International edition

75p US\$3.25 March 1984

*The independent Dragon magazine*

**Multi-colour printers  
reviewed**



**Win: sprite  
graphics  
board from  
Premier**

**Banish  
OM errors**

**Beat the cube**



3D + 2 Screens  
Ken Kalish's latest

Steve Blake now  
displays 2 screens



# THE BEST DRAGON 32 Software Company just got BETTER



Foot on  
the T.V.  
1st for the Dragon



A real home  
game



By the  
same  
author as Shuttle

Exciting new  
game from  
America's Mark  
Datta Productions



Game  
Thriller  
best of  
many

3 Screens +  
Levels  
another Ken  
Kalish winner



Mark Datta's high  
quality Space Invaders



With Pedraro  
Real Time Star Trek  
in full machine code



## MICRODEAL 1984

41 TRURO ROAD, ST. AUSTELL CORNWALL PL25 5JL TEL 0725 3496

On Cassette £8 each



Selected titles available from larger branches of Boots, John Menzies, Spectrum Dealers and all good computer shops



# DRAGON USER



Telephone number  
(All departments)  
01-437 4943

Editor  
GRAHAM CUMMINGHAM

Assistant Editor  
ANDREW BRIGGS

Software Editor  
GRAHAM TAYLOR

Editorial Secretary  
CLEO CHERRY

Advertisement Manager  
DAVID LARK

Advertisement Executive  
SIMON LANGSTON

Administration  
THERESA LACY

Managing Editor  
DUNCAN SCOTT

Publishing Director  
JIMMY IRELAND

Subscriptions  
UK £16 for 12 issues  
Overseas (surface) £19 for 12 issues  
RDM 008-8117

Dragon User, 12-13 Little Newport Street,  
London WC2R 2LD

US address: c/o Business Press  
International, 201 East 42nd St, New York,  
NY 10017

Published by Sunshine Books, 2001 Press  
Ltd, (©Sunshine Books 1984),  
Typesetting by Chesham Press, Chesham,  
Bucks. Printed by Elen Fisher (Southend)  
Ltd, Southend-on-Sea, Essex.  
Distributed by S.M. Distribution, London  
SW9 6JL-274 8611. Telex 281643

Registered at the Post Office as a news-  
paper.

Dragon and its logo are trademarks of  
Dragon Data Ltd.

## How to submit articles

The quality of the material we can publish in  
Dragon User each month will, to a very great  
extent, depend on the quality of the dis-  
coveries that you can make with your Dragon.  
The Dragon 32 computer was launched on  
to the market with a powerful version of  
Basic, but even a very poor documentation.

Every one of our subscribers a Dragon will be  
able to discover new tricks and gems almost  
every day. To help other Dragon users keep up  
with the speed of the development team of  
all must assume that we made the discovery first — that means writing it down  
and passing it on to others.

Articles which are submitted to Dragon  
User for publication should not be more than  
2000 words long. All submissions should be  
typed. Please leave wide margins and a  
double space between each line. Programs  
should, wherever possible, be computer-  
printed on plain white paper and be accom-  
panied by a tape of the program.

We cannot guarantee to return every  
submitted article or program, we please keep  
a copy. If you want to have your program  
returned you must include a stamped,  
addressed envelope.

# Contents



## Letters

4

Including this month's 32-anays, more on  
disk drives, Pettigrew's Diary announce-  
ment, and hints on loading

## News

9

A bumper bundle of releases from Premier  
plus the latest on the CG-8 and Plus  
operating systems

## On the run

12

This month's software review looks at  
some of the latest games for the Dragon —  
a feast for arcade and adventure fans

## Software Machine

19

Beto Lelid takes an idiosyncratic look at  
the new releases in the US in the first of his  
regular columns

## Printer power

20

Michael Watts looks at the possibilities and  
price of multi-colour printing in this hard-  
core review

## Tracking

26

This month's star game sets you up in a  
frank — the aim is to get as far as you can  
without running out of fuel or falling to  
pieces

## Rubicube

28

Learn how to simulate the famous cube

## The Basic shuffle

33

Banish the OBI syndrome and make the  
best use of available store by taking the  
guesswork out of allocating your data  
storage areas

## Interfacing

39

Turn your Dragon into a simple storage  
oscilloscope

## Input/output

45

John Gotschal puts the record straight on the  
Dragon's input/output routines

## Software File

47

This month's selection from the best of  
readers' programs — PIMODE and  
POOPY patterns, Spelling Tutor, saving  
and filing data, Roadside and Breakouts

## Dragon Answers

65

Help it all hand on the string function, FOR  
NEXT issues, cartridge addresses, com-  
pilers and security

## Competition Corner

66

Premier gives you the chance to add spike  
power to your Dragon — if you can get  
lucky at results

# Editorial

"DRAGON DATA HAS slain the Dragon" was the general response to the announced  
cost of moving up from a Dragon 32 to the CG25-84. But while the comments we received  
were angry, their number was few — which suggests that most users are content either  
with the offer or to play with their 32s.

Dragon Data is offering to exchange a 32 plus £148 for a 64. One reader thought his  
option of this was "unprintable". Less extreme reactions ranged from "outrageous" and  
"idiotic" to a more "sanguine" response from readers who have owned their  
Dragons for longer. One user is "perfectly happy with the idea of a part-exchange but  
would prefer an allowance of around £100 against the 32 rather than £55". However, his  
machine "is over a year old and has been used almost every working day since  
purchase, often for more than 12 hours at a stretch". The allowance offered was  
roughly in proportion to the length of time users had owned Dragons — for example, a  
reader with a seven-month-old machine would have settled for a £45 allowance, leaving  
£80 to be paid.

One user was not just annoyed about the money. He thought the 64 couldn't match the  
competition — "it had an improved display and sound facilities that perhaps it would  
be a better proposition". As we said when reviewing the 64, moving up from the 32 would  
not make sense for many users (do you really need those extra 8K?), but the 64 is likely to  
be a much more attractive proposition for certain tasks once the CG-8 operating system  
and associated applications software are available. The same reader thought it would be  
better to sell your 32 "and buy a higher specification computer" — although  
second-hand prices are likely to fall as a result of Dragon Data's decision. He also  
thought the company should have abandoned compatibility with the 32 to produce "a  
real winner" — but what price your 32 software then?

One user has already decided to sell his 32 second-hand and "buy a machine from a  
manufacturer that will be useful to its supporters". We wonder which one he has in mind  
and pass on another, partly satisfied reader's comments. "One of the reasons we bought  
a Dragon in the first place was that Dragon Data looked like a company that wouldn't cut  
to its customers. For example, it actually launched the Dragon by selling working  
computers in shops. You paid your money and carried one away. Your editorial  
reviewed Commodore. We wouldn't touch Commodore products with a barge pole  
precisely because of that company's attitude to its customers. Data Averts." The problems  
for Dragon Data is that many more buyers either disagree with this reader or also own  
something longer than a barge pole.



THE INTERNATIONAL VIDEO GAME OF THE YEAR COMPETITION  
HERALDS THE "NEW AGE" IN VIDEO/COMPUTER GAMES

# \$175,000 TO BE WON

AND THAT'S  
JUST FOR  
STARTERS!

CREATE A NEW VIDEO  
GAME AND YOU COULD

MAKE YOURSELF A  
MILLIONAIRE

IRP



International  
Video  
Game of the  
Year

Create a brilliant, new video game and you could be on your way to becoming a millionaire. This fantastic competition, organised by IRP (The International Register of Independent Computer Programmers Ltd) and the famous Mark McCormack International Management Group, offers programmers and inventors the opportunity of a life time. There are huge, immediate cash prizes and the on going revenue of 10% of the sales of all games to distributors throughout the world, plus the chance to appear on an international TV show. Your skill and imagination could bring you fame and fortune!

## \$100,000 FIRST PRIZE!

PLUS

FIVE \$15,000  
RUNNER-UP PRIZES!

Design a totally original new video game in one of these categories: SPORTS, SIMULATORS, ARCADE, STRATEGY, ADVENTURE/FANTASY or a special section which covers programmes that are not necessarily games but have outstanding Educational or Entertainment merit. We'll also be announcing a number of "MIST" awards which will be entitled to carry the message: "An

International Video Game of the Year MIST AWARD" on their retail packaging. It's a great challenge. And the rewards, both financially and in terms of prestige, are tremendous. This is the most exciting competition ever for creative computer and video enthusiasts.

### YOU'RE A TV STAR TOO!

All winning games and their inventors will be featured on an internationally distributed spectacular TV special. That's going to make your name!

## HOW TO ENTER

Just send in your game, or games, programmed on cassette for any popular home computer. Use the coupon, today, and we'll send you all the facts you need.

**CLOSING DATE FOR ENTRIES IS  
31st MAY 1984**

To: IRP Limited, Pinewood  
Film Studios, Iwer, Bucks,  
England.

Name

Address

(141)



# Oasis Software present...

## The first basic compiler for the DRAGON 32



### SPRINT BASIC COMPILER by Dr. David Gray FOR THE DRAGON 32

SPRINT compiler is a subset of standard Dragon BASIC which covers arrays, strings, for next loops, in fact virtually everything except floating point arithmetic and associated commands. All arithmetic is integer and the Dragon sound and graphic commands are fully supported.

The technique used is based on the approach used in L.I.C.D. Pascal where the Basic program is first reduced to intermediate code and this is then executed using a fast time package which is saved with the rest of the compiled program.

- Programs will run 4-10 times faster
- Almost the entire Basic is supported, with the exception of floating point commands.
- Code produced will run independently of the compiler (for potential authors)
- Programs are compiled from tape under console control so that much larger programs can be compiled
- SPRINT is designed for ease of use and a comprehensive manual is included.
- Free demonstration program with each program bought to illustrate the full power of the Compiler.
- All Oasis products are covered by a lifetime Guarantee.

### JUST RELEASED

DRAGON PASCAL £14.95

Dragon Pascal is an extended major subset of the dragon and programmed in single Pascal. A few of its many features include:

- A complete set of structured programming constructs
- IF, THEN, ELSE, WHILE, DO, GOTO, GOTO
- COMPILER, EDITOR and SOURCE (simultaneously resident for a rapid development cycle and total ease of use)
- Very rapid compilation. Source can actually be compiled more rapidly than it can be input
- Fully recursive.
- Supplied complete with sample programs including routines which demonstrate techniques for simulating floating point functions such as SIN and COSINE.

OASIS SOFTWARE Alexandra Parade  
Weston-super-Mare Avon BS23 3QT  
Please send me

SPRINT Basic Compiler £14.95 ☐

DRAGON PASCAL £14.95 ☐

Name .....

Address .....

ACCESS orders  
taken by phone — 0934 41 9921  
24 hours a day

# DRAGON 32



## DRAGON CHESS £9.95

- Six levels of play.
- All legal chess moves including en-passant, castling and pawn to queen promotion.
- List of previous moves stored which can be displayed or printed.
- Loading and saving of games positions from tape.
- High resolution graphics which can be flipped round to make black or white play from either end.
- Simultaneous text and graphics.
- Slides can be exchanged at any stage.
- Best move hint.
- Set up from any position.
- Opening move library.
- Moves may be taken back and play resumed from any point.
- Change level of play at any point in the game.
- Will adjudicate games between humans.
- Very high standard of play.
- Professional packaging and lifetime guarantee.

"Dragonchess is without doubt the best value chess on the market today..." (Microbit)

Dragonchess is available from and original software stores.



"... I thought this was an excellent version of the game. Well worth buying..." (Home Computer Weekly)

## BACKGAMMON £5.95

## OTHELLO £5.95

## INVADER CUBE £5.95

## DOMINOES £5.95



The well known game of backgammon complete with full instructions and computer demonstration for beginners.

At last, Othello is here on its own! Sometimes known running as your Dragon 32, it levels of play, full instructions and computer demonstration for beginners.

As well as being one of the best games of skill written for the Dragon 32 it also has some of the best picture machine code graphics ever home seen.

Two games in one with full instructions, hours of interesting fun the program has 12 levels of play and on the higher levels adapts its play to a assessment of your ability.

## Mind Games Compendium

### All five games for just £19.95

ALL BASIC PRICES INCLUDE VAT AND P&P AND EVERY GAME PRODUCT IS PROMPTLY DESPATCHED AND INCLUDES A LIFETIME GUARANTEE.

If your local dealer does not stock these products then let us know his address and we will contact him.

ACCESS ORDERS  
TAKEN BY PHONE  
24 HOURS A DAY



0934 419921

OASIS SOFTWARE  
ALEXANDER PARADE  
WESTON SUPER MARE  
AVON BS20 9ET  
TEL 0934 419921

Please send me	
DRAGON CHESS	£9.95 <input type="checkbox"/>
BACKGAMMON	£5.95 <input type="checkbox"/>
OTHELLO	£5.95 <input type="checkbox"/>
DOMINOES	£5.95 <input type="checkbox"/>
INVADER CUBE	£5.95 <input type="checkbox"/>
MIND GAMES COMPENDIUM	£19.95 <input type="checkbox"/>

I enclose cheque/PO for £

NAME .....

ADDRESS .....

**OASIS SOFTWARE—**  
**Intelligence in code.**

NEW FROM  
**MICRODEAL**  
**FILMASTR**  
Dragon 32  
Data Management System

The Data Management System you can trust. **FILMASTR** combines the best features of the big systems to provide a combination of speed, power and ease of operation that can't be bettered.

YOU are in complete control of this friendly program with no programming knowledge required. You design the data screen with up to 20 fields by moving the cursor on screen with the arrow keys and typing in the field names. . . . **FILMASTR** takes care of everything for you.

Error data by just filling in the blanks this form fill-in is easy and natural to use. You can even copy data from previous records with one key stroke. **ADD RECORDS, DELETE RECORDS, CHANGE RECORDS, ALL WITHOUT FUSS.**

Tell **FILMASTR** to sort your file on any field that you want or to retrieve a particular file and the job is done with super-human machine language speed. **FILMASTR** will find a single file or a group of files that meet your request and will save those records as a separate file if you want to.

Available from Dragon 32  
Dealers Nationwide or,  
direct from

**MICRODEAL** Limited,  
41, Truro Road, St Austell,  
Cornwall, PL25 5BE.

24 hour orderline: 0726 3456

**£19.95** includes p&p



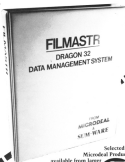
Send First Class stamp for our new  
Dragon 32 catalogue.

**CONTROLLED PRINTING FORMATS? OF COURSE. . .** tell **FILMASTR** which records to use which fields to print and in what order. You can control the print location to any position on the page.

**MAILING LABELS? NO PROBLEM.**

All commands are given to **FILMASTR** with single keystrokes. Press the **HELP** key (**BREAK**) and the available commands are displayed. Make your choice from the menu and let **FILMASTR** do the work.

**FILMASTR** can store up to 64 characters in each field and 24,000 characters in each file.



Selected  
Microdeal Products  
available from larger  
branches of



# High level operating for all Dragon users

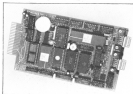
**FLYING** A high level operating system on your Dragon 32 is now a possibility using a new component card from Andia Data Systems.

Flex is the system which the card supports for 32 and 64 users — but it also supports two other systems on the 64, OS-9 from Dragon Data and Mumps which is available from Troth Data.

Basically these disk operating systems, sometimes known as environments, manage the running of your Dragon and its peripherals.

Andia's Jim Anderson points out that adding the card and whichever operating system is preferred will turn your Dragon from a home computer into a "professional low-cost disk-based computer system". A Tandy Colour TRS 80 32K or 64K can be similarly transformed.

In addition to the operating systems, the card supports four output devices: a standard 32 by 16 screen, an 88 by 34 column screen via serial port 0, a local 16x6 character screen, and a modem via



Transform your Dragon with Andia's component card

serial port 1.

Four input devices are also supported: local computer keyboard, external keyboard via serial port 0, and a modem via serial port 1, with the fourth undefined.

Hardware features include two serial ports with bidirectional handshake lines, software programmable baud rate generator and a real time clock.

One other hardware feature

should be of particular interest to 32 users: the 64K of RAM which allows Flex to be run on the Dragon 32. When used on the 64 it allows rapid page switching.

Jim's version of the three operating systems supported is that OS-9 "should be quite big, particularly as software written on it can be moved up to 68000-based machines".

Flex "is more general purpose with a tremendous

amount of software available". It is on sale in this country for about £190 including editor and macro-assembler.

Mumps is "mainly new to the micro world but has got to be looked at seriously, particularly for test applications." Troth Data is at 11 Newgate Street, Leicester.

The card was developed for use by the 6800 Micro Group, chaired by Jim himself. When he realised the card's market potential he decided to make it available on a commercial basis.

Jim sees demand for the card coming from commercial users, software houses and "top-end enthusiasts who want to use Flex in its true environment without buying a more expensive machine".

Prices range from about £190 to £250 depending on configuration. The latest configuration includes an extra 64K of user program on top of the Dragon's internal memory.

For further details contact Andia Data Design, 41 Pembroke Road, Harlow, HAI 3UD — or call 01-422 4724.

## An inside view of the insides

**NOT CONTENT** with helping to develop the Dragons 32, 64 and under-works "128", Dragon Data's technical software manager has put his hand to book writing.

The book in question is *Inside the Dragon*, written by Duncan Broad and Ian Sommerville, and published by Addison-Wesley at £7.95.

Duncan is the Dragon Data manager while Ian is a lecturer on computer science at Southampton University, where Duncan too was a lecturer before joining Dragon Data last July.

Inside the Dragon is aimed at users who have got past the beginner's stage. "No one who wants to do more with

their Dragon than play games can afford to be without it," explain the publishers.

Duncan adds that "the book contains virtually everything I know about the insides of the Dragon" — and he was design consultant on the software side for the Dragons 32 and 64. At the moment he's working on the system software for the "128".

Technical subjects covered in the book include input/output hardware and software, graphics hardware, and Dragon Data's own disk operating system.

The book also contains details of the 6809 chip on which the Dragon is based — its architecture and programming instructions.

Data sheets are also included for this chip, along with the SN74LS173 multiplexer, the 6847 video display generator and the 6821 peripheral interface adaptor.



**THE RESEMBLANCE** to Roger Moore isn't stunning but the costume does come from the James Bond film "Moonraker". The rig forms part of the promotional tour run earlier this year by Microdeal to promote its *Space Shuttle* game. The company also ran a competition in conjunction with the tour offering £1,000 worth of its software as prizes. Twenty different towns in the south of England were visited — from Ashford in Kent to St Asaph in Cornwall, Microdeal's home town. Winners are being chosen from each area, with each standing to win £50 worth of games software from the company.



YOU KNOW THAT other micro which is always being showered with praise, the 6809. Well Cambridge Microprocessor Systems has thought of a way to make it even better — by adding on a slide processor, the slip of the heart of the Dragon. Cambridge's single-board 6809 processor card costs about £250. Another £150 allows 6809 owners to keep in step with Dragon users — it allows them to run disk software under the Flex operating system. But Taylor explained that the 6809 is a "really super processor which, with its 16-bit internal structure, is much better than the 6800's 8000". Cut-down versions of the board can also be used as controller cards for the Dragon. Cambridge Microprocessor Systems is based at 71 St Margarets Road, Bilton, Cambridge — or telephone (0223) 276751.

## OS-9 system hits the streets

BY THE time you read this the OS-9 operating system from Dragon Data should have arrived in the shops.

Dragon Data expects the operating system, plus Basic OS and three main business packages, to go on sale towards the beginning of February.

Other languages such as Pascal and C are expected to follow at the end of February — along with the editor/ assembler/compiler.

The first three business packages are Syngraph for word processing at about £80; Dynamic, a spreadsheet package at £80; and the Record Management System database at £55.

Other business packages are on the way, covering such items as Cash and VAT.

OS-9 itself costs about £40 — plus a £20 reference manual. The editor/assembler is £50. This compares with about £130 for a similar combination in Flex, the other main high-level operating system for 6809-based machines.

Dragon Data points out that "OS-9 enables advanced application software to be easily run on a Dragon 64.

"The more advanced the operating system is, the more advanced will be the software that is written to run under it. OS-9 is very advanced."

The UK agent for the American-written system is Vivacity which describes OS-9 as a "multi-user, multi-tasking, real-time, Unix-like operating system".

This means that one person can run several programs — and more than one person can be using the computer at the same time.

Vivacity adds that OS-9 improves on Unix by using modularity and doing away with disk swapping.

"The operating system is made up of several discrete modules, which are automatically recognised by the operating system when it is run.

"This means that it is a relatively easy matter to adapt or expand the operating system by altering only selected modules or writing new ones."

# SOME HAVE IT



If you've reached the stage where the restraints of your 6809 based computer are becoming a bore, cast your eye over this advertisement.

After 4 years of research, in conjunction with T.S.C. Incorporated, Compuserve are launching "The Flex" in Britain.

Sales have already reached the 100,000 mark worldwide, which will give you an idea of how successful the product is.

FLEX is an elegant, friendly and efficient disk based operating system. It is supplied with a 200 page manual and includes an editor and an assembler.

All very well you may be thinking, but what will it do for me? And why should I replace my existing package? Or indeed, why buy one at all?

Our reply is simple. We let the facts speak for themselves.



# OTHERS DON'T



FLEX's features are dynamic file space allocation, random and sequential file accessing, user start up facility, automatic drive searching, file dating, space compression, complete user environment control, English error messages, over 20 commands for normal disk operations and there are high quality software packages available on disk.

It requires the 64K Dragon and at least one disk drive or any 6809 based micro-processor or system that supports disk drives. FLEX is also available on the BBC Model B.

In short, this product enables you to use your computer to its full potential. A whole range of new facilities and controls will be at your disposal. You may even think you're using a new machine what with all the extra functions you'll obtain.

Oh yes, one last thing we'd like to tell you. It knocks the spots off the competition and it's cheaper!

Send £7.50 (incl VAT) for fast mail order service. Credit card holders can also order via the telephone.



## COMPUSENSE LIMITED

Box 559, 289D Green Lanes, Palmers Green,  
London N13 5AA. Tel. 01-882 0681/69.95 (24hrs)  
Telex: 8813271 GPCOMS G

FLEX is the registered trade mark of Technical Systems Incorporated

## Bumper bundle from Premier

A BUMPER bundle of program aids has arrived from Premier Microsystems.

If you want to enhance your Dragon, there's Toolkit; if you're interested in assembler language, there's Encoder 08; if you own drives, there's disk conversion packages; and if it's graphics you're after, there's a sprite board and Doodle-Master.

Toolkit adds utilities, basic words and function keys to your Dragon. It costs £29.95 as a cartridge, £24.95 incorporated with Premier's Delta disk cartridge, or £25.95 if fitted to a Delta cartridge you already own.

Toolkit's screen editor is linked to the Dragon's line editor which has been enhanced with four new commands. The eight programmable keys can call each other and more than 80 words have been added to the Dragon's Basic.

The range of new commands includes ERROR HANDLING, VARIABLE OUTPUT/INPUT, TRACE and SEARCH and REPLACE.

Twenty-five full colour low resolution graphics screens are also available with commands for writing to any of them or swapping and moving.

## Electric aids

ELECTRICAL engineer Peter Williams has designed various industrial packages extending the Dragon's range of serious applications.

Peter argues that "rather than writing time on large mainframes, electrical companies could save money by buying a micro such as the Dragon".

The packages he is offering cover power system fault level, short circuit cable sizing and cable scheduling — at £35.00, £5.00 and £25.00 respectively. He points out that the prices are low for industrial software. A trace testing program is next in line and others will follow.

For further details write to Peter at 10 Chappell Close, Gillingham, Cleveland.

Further graphics aid comes from the sprite graphics board with 256 by 192 resolution, 10 colours, 750 programmable graphics characters and full upper and lower case display.

Each of 32 display "layers" can be moved without disturbing the others. As Premier explains this makes possible effects such as a walking man moving behind one object and then in front of the next.

The board costs £95.95 as a kit, and about £27.00 extra fully assembled.

The other graphics package, Doodle-Master, allows you to define up to eight shapes at a time on the four-colour hi-res screen. Up to 20 may be created if no Basic is resident. Shapes can be swapped and moved — once you're happy with the results they can be used in other programs.

Characters can be created in green, blue, red and yellow; the inverse cyan, magenta, orange and blue can also be displayed. Doodle-Master costs £17.95 on cartridge or £15.95 on Delta-compatible disk.

Owners of the Dragon Delta disk system (Dragondos) need not feel disadvantaged. Premier is offering to convert their systems to Delta for £29.95.

Conversion the other way will also be possible with a utility disk able to reformat Delta software to run under Dragondos. This disk offers other utilities such as sector editing and reading CORNIO.

The last of the new releases is Encoder 08, an assembler disassembler/monitor with symbolic assembler, standard mnemonics and pseudo opcodes. It uses Basic for its editor so that line editing is always available immediately.

Encoder costs £24.95 as a stand-alone cartridge or £24.95 incorporated with a Delta cartridge. But you'll have to choose between Encoder and Toolkit as there's only enough space in the Delta cartridge for one or the other — or you could move up to a motherboard.

Encoder costs slightly more, £27.95, if you want it fitted to a Delta cartridge you already own. For details of this service call Premier on 01-656 7130.

# On the run

John Scriven looks at the latest software



In GREEK mythology there is the story of one Sisyphus, who was condemned to push a stone up a steep hill. When he reached the top, it would roll down the slope until it rested once more at the bottom. At this point, the luckless Sisyphus had to begin his task all over again. This story came to mind several times while looking at the software this month. I thought of it as I waited for the unspooled cassette to load, and again as I battled with the head band of aliens that came my way. In my more jaundiced moments I felt glad that I hadn't paid out my hard-earned savings to see the game in question.

If there has been a recent trend in some computer programs, it seems to be that the software matches up even less to the steadily more imaginative (and imaginary) artwork on the packaging that it arrives in. Before you think that I am still suffering from an excess of Christmas pud, rest assured dear reader. The truly bad programs aren't even mentioned this month, and hiding in the pile are some that are models for the rest to follow.

First, the arcade action games. *Whirlybird Run*, from Dragon Data, involves piloting a helicopter over mountainous terrain, while destroying enemy rockets

and bases with guns and bombs. As the game progresses, you enter a cavern that scrolls across the screen as you meet more dangerous opponents, while avoiding running out of fuel. If this sounds familiar to you, it should do, as this is simply a rather good version of the arcade favourite *Sonaria*. The number of machines left, and the amount of fuel remaining, are shown at the top of the screen. One point always strikes me about this game — I can never grasp the logic that fills up your fuel tanks each time you bomb a fuel dump on the ground in spite of this, and the fact that you seem to have a limitless

Dragon Data  
Riding Industrial  
Estate  
Mangon  
Port Talbot  
W Glam

Romik Software  
272 Anyall Ave  
Slough  
Berks

Virgin Games  
81 Portobello Rd  
London W11

Dungeon Software  
Milton House

**Whirlybird Run**  
£12.95

**White Crystal  
Concoy Attack  
Cyclaps  
Strategic Command**  
Romik Cate  
£9.99 each

WGB  
£6.95

**Treasure Tomb**  
£7.95

## Under review

St John St  
Aldersome  
Derbyshire

J Morrison Micros  
2 Glensdale St  
Leeds

Phoenix Software  
Scares House  
116 Marsh Rd  
Pinner  
Middle

Temptation  
Software  
17 Norton Rd  
Software

**Giant's Castle**  
£5.95

**Crusader  
Maulice Minor**  
£6.95 each

**Death Mines  
of Sirius**  
£9.95

**Searchword  
Micropoly**

27 Circus Potts St  
Plye  
Sussex

Beyond  
Competition House £8.95  
Farnham Rd  
Mortlake  
Leicestershire

Shandy Software  
189 Elm Rd  
Brent  
Essex

Salamander  
Software  
17 Norton Rd  
Brighton  
E Sussex

**Up Periscope**  
£8.95

**Engage**  
£8.95  
**Pettigrew's Diary**  
£7.95

**Lost in Space**  
£8.95

**A DATAPLUS OFFER**  
 THE  
**TP-1** inc VAT  
**ONLY £250**  
**DELIVERY FREE**



*'Dataplus have made their name supplying computer peripherals at competitive prices. I believe that we have now found the best price/performance dot matrix alternative to dot matrix. The ideal printer for both data and word processing. Truly, a high quality machine at an affordable price. As Managing Director, I guarantee you won't buy better.'*

So whatever your computer — BBC, Spectrum<sup>®</sup>, Commodore<sup>®</sup>, Dragon, Oric, Apple and many others — make the most of it and turn your computer into a quality printing system for home correspondence, documents, short stories and business use.

Use standard stationery or, for ONLY £75 (if ordered with your TP1) we will supply a tractor feed so you can use continuous or fanfold paper.

This is just one offer you can't miss. To avoid disappointment **RING NOW** on our 24 hour answering service 0242 527412 to place your order quoting your Access Barclaycard No., expiry date and full name and address. O/R complete the coupon below and **POST TODAY**.

Please allow 25 days delivery. If not completely satisfied return goods in original packing within 10 days of receipt and we will replace or refund your money in full.

For technical queries telephone our Expert Hotline 0242 37372 or visit our showroom at 39-40 Roman Road, Chesham.

\*IBM 64 & Spectrum Computers require a special interface cable kit. For assistance & price quote our Technical Hotline

*Reithorpe*

#### **SPECIFICATIONS**

Print Speed: 120-spm  
 Character set: 96 ASCII 96 printable  
 Character spacing: 10-CP  
 Printing: bidirectional  
 Paper width: 12" max.  
 Writing line: 10.5" 105 character line  
 Line spacing: 5 lines per inch  
 Paper Feed: Friction, single sheet or tractor  
 (20-volts, 50Hz)  
 Dimensions: 240x420 (250x550) 250x550  
 Weight: 18.5 lbs

**Operator Controls:** Power switch, top of back; impression controls (5 levels)

#### **INTERFACES:**

##### **Parallel**

Compatible computers: Tron parallel data, 3 control lines (data, strobe, busy, acknowledge)

##### **Serial**

RS232C compatible (30-19200 BPS, parity and character set optional) serial interface

Dataplus-PS Ltd 39-40 Roman Road Chesham GL51 6DQ, Reg. No. 1715271 England. Offer open to UK only while stocks last.

To: DATAPLUS-PS Ltd 39-40 Roman Road Chesham GL51 6DQ  
 Please send me: —

Qty	Description	Price	Total	Continuously checked for £ ..... 000000
	TP1 with RS232C interface	£250		and made payable to DATAPLUS-PS Ltd or change the Access Barclaycard Account No.
	TP1 with serial interface	£250		
	Interface cables (separate)	£ 0		
	Tractor Feed	£75		
*Delete as appropriate		Total		

Expiry date of card: .....

Signature: .....

Name: .....

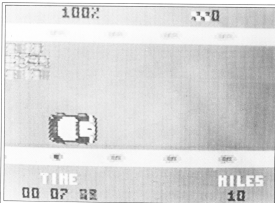
Address: .....

Postcode: .....

Telephone No: .....

Make/Model of my computer: .....

# DATAPLUS



*Blaster Master — you play while out for a Quick Draw if your car is shown on a mission-going errand in the middle of a war.*

supply of ammunition, the game is fun to play.

A more serious criticism is that it is priced at £12.95, which is rather expensive. Perhaps in an attempt to justify this price, Dragon Data has produced the worst example of over-packaging I have yet seen. The single cassette is contained in a full-sized video-cassette box, more than nine inches by seven inches in size, and over one and a half inches thick. The instruction booklet is A5 in size, yet the text could be fitted on one page. Finns like J. Montson Micros, Premier and Salsander use a mini cassette case which is tiny, but Dragon Data has made a mistake in using packaging that is so wasteful.

### Intelligent

Norman has been producing Dragon software almost since the birth of the machine, and its game, *Strategic Command*, is a good example of using the computer as a display area for decisions made by two human players. Their recent titles show a move towards more machine-intelligent games. *Convoy Attack* is written by the same author, and consists of two parts. Part one entails guarding a convoy that appears as small ships at the bottom of the screen. Enemy missiles fly steadily towards your convoy, and can be destroyed by launching these planes from your aircraft-carrier and steering them into the path of the missiles. If your carrier is still intact at the end of the first wave, the

screen shows in high-resolution a dog-fight between you and the enemy. Norman sets a good example by putting an actual screen-shot of each program on the cover of its cassette, and you are not tempted by false promises.

Norman also produces a real-time graphics adventure game called *White Crystal*. This consists of a complex cave system — you enter at the bottom — linked by a series of ladders. In the cave are chests of gold, food and the white crystal itself, which must be struck by your sword. You control a small figure using the cursor-control keys, and the program shows that games do not always have to be written in machine code to be worthwhile. One small niggle is that the program does not disable the other keys, and "break" is rather close to the controls for comfort.

Another graphic adventure game written in Basic is *Treasure Bombie* from Dungeon Software. Apparently, there is a vast dungeon complex beneath Blackdown Tor, containing Arthur's treasure. Set in Norman times, you can explore the labyrinth discovering the hidden wealth, while avoiding Merlin and his evil servants. Although this is not in the same league as fast-moving machine code games and only uses the lowest resolution display mode with symbols to represent the objects, the game is entertaining and interesting to play.

Another adventure-type program from

Dungeon Software is *King's Castle*, a program designed for younger users. The object is to rescue a fair damsel from the giant's castle. In order to achieve this end, you must gain points by answering general knowledge questions. As the program is written in Basic, these are easy to change according to your requirements. The program uses a variety of tunes and drawings to enliven the proceedings but possesses some irritating features. The worst one is that occasionally you may be presented with a set of boxes. Choose the incorrect one and the program does not simply deposit you at the start again, it *NEWs* itself and you have to reload the program if you wish to play again. Hardly the best thing in a program designed for children.

### Intrepid

J. Montson Micros has an original game in *Crusader*, another graphic adventure game that employs good use of graphics. Using the joystick, you control an intrepid knight as he charges up flights of stairs and along castle walls that scroll along behind him. Littering his path are score-pans, enchanted lakes and mysterious cleaves. Each time you lose speeds upwards to heaven. Having jumped over the sworpions and swung across chasms, the sleeve notes assure me that I shall reach the inner sanctum and that the Holy Grail will be within my grasp. I have to take their word for it, as I have yet to get past the dragons. This game is to be highly

# **CHESHIRE CAT** **EDUCATIONAL SERIES** from **AMPALSOFT**



## **CHESHIRE CAT** **The First name in Educational Software.**

An exciting range of top quality programs  
covering all needs from pre-school to 'A' level.

Now available from Boots and other good stores.

Ampal Computer Services Ltd.  
31 Woodbridge Road, Darby Green, Blackwater,  
Camden, Surrey.  
Tel: (02933) 876677

commented, and is similar in concept to *Cultbert in the Jungle*.

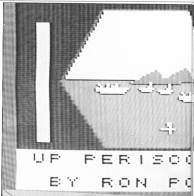
Having once seen the amazing graphics on the Atari motor-racing games, those written for other micros tend to come off second best. The displays are not up to showing the view from the driver's position, and usually rely on the screen scrolling downwards or to the left. Maurice Minor, also from J. Morrison Micros, uses the latter method. The story is that one day, while out for a quiet drive in your car, it drifts on to a Grand Prix motor-racing circuit in the middle of a race. The joystick changes your direction, but you are constantly wandering to the left or right, and oil patches appear under your wheels. This would be difficult enough if you were on your own on the track, but cars are constantly rushing past you unless you can accelerate using the fire button and stay out of trouble. You can enter your level of driving expertise at the start (*Novice* is a good level at which to begin), and the road is yours. If you collide with the barrier or another car, a bit falls off your "Maurice Minor". The object is to complete 10 miles in the shortest time while still retaining enough of your car to get you round. Again, this is hardly teaching the thrills of arcade action, but it's good as Dragon car race games go.

### Energy

*Cyloids* from Permik is loosely based on Pac-man, in that it involves chasing round a maze eating energy modules. It differs in that you can choose many different combinations of conditions, such as how many cyloids are after you, whether they are intelligent or not and how fast they move. Hidden in the maze are black holes that can send you spinning into another maze, more complex than the one you're in. If you don't like a version of Pac-man, this game can be recommended as it gives so many varieties and is less likely to become boring.

*UGB* was the wartime expression for an unexploded bomb, and Virgin has used it as the title of one of its programs. The aim is to defuse the bomb of the title, using only six items from a special locker. The program is menu-driven, and you can choose to view different sections of the bomb, or to attempt to defuse it. Although original in concept, there seemed to be only one correct path, and it was irritating being constantly taken into little pieces. It also managed to crash the program twice unaccountably. The inputs are not map-trapped, and this spoils an attempt to produce an original game.

A game that attempts to bridge the divide between arcade and adventure programs is *Death Mines of Sirius* from Phoenix Software. The packaging is fairly large, but does contain two cassettes and instructions. As the program started and I entered Y for more instructions, I had to check the loudspeaker on my TV — the quality of the music was the best I had heard from my Dragon. Then I realised that the speaker was reproducing recorded music on the tape. Strains of *Searchers* filled the air, as a voice told me of the rescue mission I had to lead.



Up Periscope — Submerses showing a convoy of merchant vessels over the sea

If you can cope with the rather pedestrian beginning, the first cassette contains a laser landing type game, in which you have to pilot a drone to the surface of Sirius and pick up some mines waiting there. As you complete this stage, you are given a code to use in the second part of the adventure. I am led to believe that this consists of a two-only adventure, but as I failed to be given the necessary code in the arcade section, I could not start this part (hangs head in shame!). If you are not too good at arcade action, you could end up very irritated with this game. If this should happen, invite a friend with lightning finger's round and discover the code this way.

A supplier that appears new to me is Temptation Software. The two programs I have seen this month, one game-utility, and the other a version of a board game, are both packaged in an eye-catching box covered in "laser-cut" discs.

The utility, *Searchword*, is a game that can be played on the screen, or can be used to generate word-squares and print them on to paper. As it is menu-driven, the program is very simple to use. Words of up to 10 letters in length can be entered, and the program inserts them into a rectangle in one of eight compass directions. Words may be saved on cassette and entered at a later stage or the whole word-square may be copied to paper, if you have a printer attached. As a game, this program is quite good, but it really scores in educational

areas. A set of spelling words, or those to do with a particular topic, could be entered by a parent or teacher, and the print-outs given to children to complete.

Monopoly from Temptation Software is a computer version of a certain well-known board trading-game known in some circles as "Go to Jail". Up to four players may participate. Some versions of this game merely use the screen as a display board, but *Monopoly* has the Dragon to play against you. All the options of the real game are present, including Chance and Community Chest. The displays are adequate, given the large playing surface of the board game, and the program is quite well written. If there are several of you, it's probably more fun to use the real game, but those closet capitalists out there may find this a way to trample on the poor at least!

Another new name in the lots of software houses is that of Beyond. Its game, *Up Periscope*, is neatly packaged, containing perfunctory graphics as well as an actual screen shot of the game in progress. This is unfortunately on the inside of the sleeve notes, so you won't be able to see it before you purchase it, but it's a step in the right direction.

The game itself can be played against the computer, or against another human, and involves moving a convoy of merchant vessels across an area of sea. There is a large island in the middle of the sea, which contains hunter-killer submarines as well

OF E!  
OTKIN

as a convoy protection fleet.

You can command either the protection fleet or the submarines in the two-player option, but you're limited to fleet commander if you play against the computer. There are two displays: the playing area, showing your vessels, but not those of your opponent; and a status report informing you of the state of play. You can never see all the sea at one time, so the cursor keys or the joystick are used to move the viewing screen over different sections. Each part of the screen is hexagonal in shape, so travel is limited to one of six directions.

Movement is achieved by centering a cursor over options shown on the bottom of the screen. These include straightforward moves, depth-charges, torpedoes and sonar. The instructions are clear, and the game easy to play. While not possessing the speed or graphics of some arcade games, it is a well-thought-out game of strategy that should while away those long winter evenings. If you play against the computer, then it undoubtedly cheats by peering at your position, but luckily, there is an option so you can do the same!

Having blown away an ocean full of submarines, the megacombat out there among you could do worse than move on to Empire from Shards Software.

At the start of the game, the world is shown as consisting of 39 blocks to be shared between you, the Dragon Empire and neutral countries. When you have



Cyclops — combinations of Pac-man



Empire — was messier than Napoleon



Lost in Space — leaving Marlene at home

allocated your forces round the globe, you and the Dragon take it in turn to invade other territories. The displays are very good, showing different continents or the whole world situation. The level can be selected at the beginning of the game from 1 to 8, and the top levels need a lot of concentration to prevent the Dragon Empire from over-running your land. If you fancy your chances as Napoleon, this is an ideal game to start with, and it's far less messy than the real thing.

After enjoying myself following the exploits of Dan Diamond in Franklin's Tomb, I looked forward to the sequel, Lost in Space. When it arrived last month, I was disappointed to see that Saturnair has over-packaged this game, using a full-sized video case like Dragon Data. Luckily, the adventure game itself is entertaining, provided you have either a knowledge of Franklin's Tomb, a copy of High-Ikar's Guide to the Galaxy, a knowledge of British Rail food, and a warped sense of humour — or preferably all four.

The display is divided into three areas: a location description, an input section, and an inventory of objects collected. It seemed to take me a lot longer to get started than in Franklin's Tomb, and the frustration count is much higher, as security robots constantly rush in and you find you are "swathed in a mist of rainbow colours" for the 10th time. There are no graphics, but there is a 16-page accompanying booklet that has pictures of re-

vious locations. In some ways I feel that Dan Diamond isn't stretched to his full potential in this game. It's a pity that the Chanderesque dialogue in the booklet isn't repeated in the program itself.

The most ambitious program this month is an already established chest-seller — Pettigrew's Diary from Shards Software. This consists of a three-part adventure game, and clues gained in each section are essential to the following part. The first part takes place in a burning farmhouse which is shown as a high-resolution display. Your position is indicated by a small cross that can be moved about the screen with the cursor keys. As you explore, you discover a body, and several other suspicious things, but all the while, the flames are getting closer. If you manage to extract the vital clues and end up safely outside once more, the quest continues in London.

## Effiel

The second part of the game is a text-only adventure. One problem is that it is in real time, and a clock is ticking away at the top of the screen. Direction is controlled by entering compass directions, as in most games of this type, and it is a good idea to attempt to make a plan as you play or you soon become hopelessly lost.

The third and last part takes place all over Europe, and consists of various mini-puzzles, such as solving mazes and preventing your contact in Paris from being harassed off the Eiffel Tower. There are limited graphics where they can be useful and something, and eventually you can use all the codewords gained in the game to bring it to a satisfactory conclusion. I'm not sure how successful this game really is, as it starts from one problem to another, and once you have solved it, there is nothing else left to do. However, this is a criticism that can be levelled at most adventure games, and this one certainly offers variety and reasonable value at £7.95.

In the dim and distant past — was it really just three years ago? — everyone wanted twiddling little coloured plastic cubes. Parker Software produces an activity — I would hate to call it a game — called Rubik Cube. Apart from normal solving of the cube, termed the "practice" game, there are two highly advanced versions for those of you who find a standard Rubik cube too easy. The "time" game has a cube where the colours of the faces change every 80 seconds. It even has a too easy for you, then the "space" version allows you to manipulate a cube in four dimensions. I am impressed by the coding on this cassette, but wonder how many people will actually want programs of this complexity.

This month, I didn't find much that really inspired me — a few competent games, but few with a spark of novelty. The games and the packaging are different, but the games turn out the same.

And now, picture peer Sisyphus reaching the last cassette for his Dragon, and as he leans back in his chair to relax, he sees the postman arrive with yet another bag full of new versions of Inad-

#### Features include

- 255 MAXIMUM NO. OF ROWS
- 255 MAXIMUM NO. OF COLUMNS
- VERY EASY TO USE
- INDIVIDUAL CELL FORMULAE
- COPY BLOCKS OF CELLS
- COMPATIBLE WITH ALL PRINTERS
- EASY 132 COLUMN PAGE WIDTH
- GRAPH FORMAT FOR BAR CHARTS
- COMPREHENSIVE MANUAL INCLUDED
- INTERNATIONAL USER GROUP
- SORT ROUTINE IN ASCENDING OR DESCENDING ORDER

- Single character comments
- Help display
- Entered or formulae 255 characters long
- Repeat last entry
- Available memory always displayed
- Repeat entry modes for text and data
- Selectable automatic cursor movement
- Insert/Delete Move entry across columns
- Replicate one cell to fill a row or column with selectable adjustment
- On-machine language for displaying speed
- >10K data storage space available in 32K systems
- Basic style formulae
- Arithmetic operators: +, -, \*, /, %, ^
- Relational operators: =, <, >, <=, >=, <>
- Logical operators: AND, OR, NOT
- Conditional formulae: IF... THEN... ELSE
- Trig functions: SIN, COS, TAN, ATN
- Log Functions: LOG, EXP, LOG
- Misc. functions: INT, FIX, ABS, SQRT
- Range functions: SUM, AVERAGE, COUNT, MIN, MAX, LOOKUP
- Nine digit precision
- User definable constant table
- User definable printer set-up commands
- Individual column width settings (1 to 255)
- Adjustable row height to insert blank lines without wasting memory
- Hide columns or rows
- Alternate print font selectable cell by cell
- Display/Print formats set by cell, row or column
- Internal, comma grouping, prefix or postfix signs
- Scientific notation, fixed point and integer formats
- Left or Right cell contents justification
- Full page formatting
- Worksheets stored with worksheet on-disc type
- Batchload disc/tape files in compact memory form
- Randomised directories
- Output ASCII file for word/printer input compatibility
- Memory resident code... no repeated disc calls

# ELITE

# CALC

NOW... The worksheet calculator program you've been waiting for is waiting to work for you. ELITE\*CALC is a powerful, full featured spreadsheet for the Dragon 32/64 and Tandy Color Computer. Answer 'what if...' questions, prepare reports and cash flow projections, maintain records and perform other tasks which, until now, required sophisticated business computers. ELITE\*CALC is a serious tool for those who want to do more than play games on their micro.

Available from stock on cartridge for the Dragon 32 or 64 or Tandy Color Computer... please specify. Shortly available on disc for the Dragon Data or Cumana-Printer or Radio Shack systems. Also available in the 5-format instead of the D-format if requested.

## THE BEST FOR ONLY

# £45

Elite\*Calc has had excellent reviews in the American press and an enthusiastic reception at the recent International Rainbowfest.

*"Elite\*Calc is a great spreadsheet program"*

Stuart Hawkinson, Rainbow

*"Truly one of the best programs I have seen"*

John Steiner, Micro

*"Very powerful program... essential to every serious user"*

Mike Jarvis, M & J Software

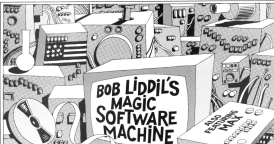
ENQUIRIES INVITED FROM RETAILERS AND  
DISTRIBUTORS (HOME AND OVERSEAS)

MICROCARE  
1 OAKWOOD ROAD,  
RODE HEATH,  
STOKE-ON-TRENT  
☎ (09383) 5695

# DRAGON 32/64

## TANDY COLOR COMPUTER





I USED TO be just an average software reviewer until I met Max. Max is a computer program, a sentient cyber being, wholly self-contained and currently residing in an EPROM pack connected by remote ribbon cables to the Dragon in the attic computer laboratory of my American house. How he came into my acquaintance is a strange, sometimes bizarre story.

The previous resident of the house was a certain Professor Megabyte — hardware engineer, tinkerer, and registered with the Genius Exchange as being on call for consultation Mondays to Thursdays. On those long weekends the professor toiled on his lifelong quest to solve the riddle of CISCs. Computer Software Dimensional Sleuthing. In lay terms, he believed that the world of computer software existed parallel to our own and that with the proper interface he could enter that world. All three of his assistants believed that this was rubbish and were subsequently sacked. After that, Professor Megabyte toiled alone.

Max came into being as an ordinary program. His name stands for Multithreaded Amusement Expedition program. That actually spells MAX but I never ask personal questions (obviously, have you ever priced a female voice chip for a speech processor?). His job was to act as a liaison between Realworld and the particular Program Module Dimension being explored by the professor. Up until the first PMD probe Max was just another program, highly sophisticated, but a program nonetheless. Then fate stepped in, hoping on some loose cables lying about.

For years Professor Megabyte had been striving for this, the moment when he would actually fulfil his dream, to meet Captain James T Kirk aboard the USS Enterprise. All the planning, the tedious calculations, and endless hours of missing his tea would pay off now. He pressed the PMD manual override button, was instantly disoriented and beamed aboard the

starship of his dreams which was floating serenely on routine patrol in a nearby Tandy Colour Computer. Needless to say, a certain Vulcan's eyebrows lifted considerably and Captain James T Kirk was very startled indeed.

Meanwhile, Max was maintaining the link, waiting for the code to bring back the professor. He recalls little of those presentence years, but what happened next, he remembers vividly.

"I was monitoring all the equipment in the lab," Max explained to me once, "the PMD stabiliser was within tolerance, the secondary balance circuits were on standby, the teapot was just beginning to whistle, when I heard, through my audio input device, a terrible crashing sound." This was later identified as a local thunderstorm.

### Seconds to act

"Suddenly, the power fluctuated wildly. I executed the emergency subroutine, to bring back the professor to Realworld. I knew that if he were caught in a PMD based dimension when the power failed he would disintegrate with the clearing of that memory and be lost forever."

Max's effort to reanimate Professor Megabyte failed due to the loss of a miniature relay in the PMD stabiliser. Realising he had only seconds to act before the power went to zero, Max opened a phone line, activated the modem and transferred to a nearby public database, the Gienegripe, the professor and some very surprised Residuals who'd been awaking up on the federation starship from hiberna.

The power surged but failed, burning out several chips in Max's EPROM pack. The sudden elevation in voltage rearranged some primal binary codes in Max's programming resulting in a severed link for the professor and self-awareness for Max.

Several months passed as Max searched in vain for the lost professor. Finally he

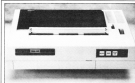
decided he had to have human help to bridge the gaps between himself and the residents of Realworld. So he offloaded himself into a photocopiering computer and advertised for a tenant for the house, Ms.

It didn't take a mental giant to figure out that, as a software reviewer, I would have it made. Max would supply me with an unlimited array of programs obtained from friends of his in the industry, both human and cyber. In return, would maintain the house in Realworld, buying him the time he needed to search through the endless corridors of software world for his lost professor. It was the perfect business deal.

By now, you may be wondering what all this has to do with Dragon User and Dragon users in the United Kingdom, Europe, Australia and New Guinea. Well, it is a known and accepted fact that American game software, whether purchased from local vendors in the UK or directly from the States, is a desirable commodity. This is not meant to low rate home-grown software which represents many innumerable hours of effort on the part of UK Dragon users. Rather it means that Max and I intend to spotlight things that otherwise would get little or no attention in the Euro-community.

And what are my qualifications for reviewing American software offerings to you? Simply put, I am sitting in the thick of it. I have first look at many items of American Tandy Colour software, even before the consumer. And many American producers are scrambling to make their products Dragon compatible.

So, for at least the next few months — while you, the Dragon Users of the world, decide whether you like this column — Max and I will be bringing you news and reviews from America. Incidentally, Max says to remind you that if you run across Professor Megabyte in any of your Star Trek programs, would you please ask him to phone home? ■



# Printing power

*Michael Watts tries his hand at four and seven colour printing*

IN RECENT months we have been presented with an ever-growing range of colour printers and plotters from a variety of sources. Notable among the multitude must be the MCP-40 four-colour printer/plotter and the Tandy CGP-220 seven-colour ink-jet printer.

The MCP-40 printer/plotter from Japan, distributed here by Micro Peripherals, interfaces with any micro supporting a Centronics parallel port and offers comparatively low facilities for the production of program lists and text or graphics in any combination of the four available colours, red, blue, green or black.

Contained in a neat, wedge-shaped, mushroom and dark chocolate coloured plastic case this compact printer/plotter (28 x 17 x 5cm) arrives in a fairly well protected polystyrene and cardboard package complete with a single roll of four inch-wide paper and a set of four of the unique, miniature ball point pens which are said to be capable of drawing up to 250 metres.

## MCP

Built on the same mechanism as the Qno, Tandy, Sharp and IBM printer/plotters the MCP-40 (Micro Colour Printer, not Mike Chauvin's Printer as someone suggested) costs £129.99 including VAT. The MCP-40 seems to be quite robust, my only reservation being to do with the pen carrier which seems to suffer quite a bit of wobbling particularly when the printer is used to turn out broken lines. In fairness the user manual does warn that the pen holder should only be moved using the printer control switches.

While on the subject of the manual I think it fair to say that this document is fairly adequate. Undoubtedly it covers the various control codes which actually make the plotter work, albeit at times in a rather obscure way and with some obvious mistakes in the sample programs. Where it really falls down is in respect of interfacing the printer to the computer. According to the manual one simply plugs the appropriate cable (not supplied) into both

the computer and the printer. As anyone who has spent hours trying to interface items of computer equipment already knows nothing in this world is that simple. I tried the MCP-40 out with a wide range of micros and in fact ran into problems with my Osborne 1. However, they are all different and really the only solution is to make sure that your supplier tells everything up for you and explains how.

Three small switches on the top of the printer handle line feed, colour selection and pen change while indicator lights are provided for power on and paper out. Underneath the MCP-40 is a bank of four DIP switches which handle the selection of 48 or 80 characters per line (Dip 1), Carriage Return only or Carriage Return and Line Feed (Dip 2) and selection of JIS or ASCII characters (Dip 3). Dip 4 is unused.

A self-test mode is provided, when by holding the line feed switch down as power is applied the printer will churn out all 80 of its available ASCII characters set in four colours. Normally, at turn on, the printer performs a short self test by drawing four small boxes, one in each colour which, while slightly annoying at times, does at least ensure that the pens are warmed up and have ink available.

Using the MCP-40 with the Dragon 32 presented absolutely no problems, the standard Dragon-Centronics cable working first time. According to the manual, instructions are sent to the printer using the LPRINT command. However, in our case a simple substitution of the command PRINT to -2, (not forgetting the comma) works every time. A brief study of the program listing (Fig 1), taken from the user manual with suitable modifications, will give some idea of the way that commands are sent to the machine by way of the PRINT -2, instruction. The output from the program in Fig 1 is shown in Fig 2 to illustrate the resolution possible.

Scoring is available in a range of sizes from 80 columns across the four inch paper to one single column and it is easy to relate the output from the printer

through 60, 180 or 270 degrees making it possible, with some work, to produce large, multi-coloured letters lengthways on the paper.

According to the information supplied with the printer accuracy (on repetition) is better than 0.2mm, on movement faster than 0.2mm, and on distance better than 0.5 percent (X-axis) and 1 percent (Y-axis). Plotting resolution is, in my view, more than adequate being in steps of 0.2mm with 480 steps in the X axis (across the four-inch paper) and no limit in the Y axis. I unfortunately have no way of checking these figures, deviation of this order being extremely hard to measure. However, a simple empirical test of drawing a line about half a metre long diagonally down the paper, returning to the beginning and repeating the process several times resulted in one single heavy line.

I found the Micro Colour Printer to be an extremely useful and versatile tool which while rather slow at about 12 characters per second is probably more than adequate for the home micro user wanting to produce occasional hard copy of programs. The ability to produce high quality, four-colour graphs, pie charts and so on must make it attractive to many, and the facility for producing four-colour screen dumps from the Dragon using a graphics dump routine like the one from Datasoft must make it even more attractive.

At around £100.00 including VAT the MCP-40 is extremely good value for money. The pens cost about £3.00 per set and the paper about £1.00 per roll — making this four-colour printer/plotter a most attractive proposition.

## Tandy

The Tandy TRS-80 CGP-220 Colour Ink Jet printer takes another novel approach to the problem of multi-colour printing by making use of an "on demand" ink jet system drawing tiny quantities of ink from its four reservoirs and applying them to the paper with a piezoelectric-type head.

Supplied in a solid cardboard box



Games that come from...

# BEYOND

CHALLENGING SOFTWARE

## 7UP PERISCOPE

*PROTECT the convoy using SONAR + Depth charges to seek out and destroy the enemy below!*



*Try and pick off your Enemy from below the waves!*



*Here comes the first flakes of snow and out of it - their Tanks!*



*... How much longer can we hold this town...?*



### KRIGSPIEL:

*A thrilling game of strategy to be played against the Dragon or any other chosen opponent.*

PLEASE SEND ME...

**Kriegspiel**

**£6.95**

**UP PERISCOPE**

**£6.95**

Total this order is a useful reminder to...

BEYOND CHALLENGING SOFTWARE



QUANTITY

TOTAL

I enclose a Postal Order - Cheques payable to BEYOND. Or charge my credit card.

Card Number

Visa Access (Delete on necessary)

Name

Address

Postcode

DLG

Signature

BEYOND Competition House, Farndon Road, MARKET HARBOROUGH Leicestershire LE19 9NR.

# DRAGON 32 OWNERS

Make your Dragon turn into a real computer with the new Double-Density Delta Disk System.

### How Do the State Treaties Govern You

- An extensible plug-in system.
- PostgreSQL (also, corresponds).
- Lets you produce and transfer report access data instantly on your site.
- Supports sequential and indexed file handling.
- Simple plug-in to Dragon.
- There are no additional tools needed to run DBAL.
- Lower expenditure (80% to 1.4 megabyte).
- ON LINE storage.
- Full range of business utility and games collections.

**DELTA  
DISK  
SYSTEM**

- The price you see is the price you pay. NO HIDDEN RAM upgrade costs.
- Up to 32 GB of user – RAM as CBLIA is field in DPCOM.
- Enables programmer to easily produce applications. Software which automatically starts up and operates without any intervention from the user.

**FULL  
RANGE OF  
BUSINESS  
SOFTWARE  
AVAILABLE.  
SEND SAE  
FOR DETAILS**

[illegible]

## TOOLKIT FOR DRAGON 32

Downloaded from <http://ajphaphysocpharm.sagepub.com> at 11:06 11 November 2014

- [illegible]

## CHEN

- **DRAGON** **Fig** **FORTRAN** **can** **be** **used** **for** **DESA** • Executes up to 10 times faster than BASIC • Language extensions by user defined words • Words can even be defined using the **FORTRAN** assembler for maximum speed • **BASIC** and **DESA** commands still available from **FORTRAN** • Source code stored and can be compiled from disk • **FORTRAN** can be moved to disk, including the file **DATAFORMAT**
- **FORTRAN** **can** **be** **used** **for** **DESA** • Executes up to 10 times faster than BASIC • Language extensions by user defined words • Words can even be defined using the **FORTRAN** assembler for maximum speed • **BASIC** and **DESA** commands still available from **FORTRAN** • Source code stored and can be compiled from disk • **FORTRAN** can be moved to disk, including the file **DATAFORMAT**

RECEIVED FROM THE UNIVERSITY OF CHICAGO

- [illegible]

**REPORT DATED BY: FROM THE OFFICE OF:**

- [illegible]

**Abstract**

- will display the price contents of your ORACON 25 high res screen for a high resolution printer. Can be used to change characters. Available if you have a high res printer.



# PREMIER

**Keywords:** child abuse; child sexual abuse; child sexual exploitation; child sexual abuse investigation; child sexual abuse assessment

1. **System Requirements:**  
 - OS: Windows 10 or later  
 - RAM: 8 GB or more  
 - Storage: 50 GB or more  
 - Internet: Broadband connection  
 - Browser: Google Chrome or Firefox



```

440 REM PLOTTING
450 PRINT#2,PRINT#2, "PLOTTING ABILITY
"
460 PRINT#2,CHR(10); "L2"
470 PRINT#2, "M252,=162"PRINT#2, "I"
480 FOR I=0 TO 350 STEP 10
490 S=1/10000,14152
500 X=SIN(S)*200, S-T+COS(S)*200, S
510 X=INT(X)*INT(I)
520 PRINT#2, "O";X; ", ";Y=PRINT#2, "H"
530 NEXT I
540 PRINT#2, "H2,=450"
550 PRINT#2, "I"
560 S=2*3.141592653/11
570 FOR I=0 TO 10
580 AC(1,1)=INT(SIN(XS)*200, S)
590 AC(1,2)=INT(COS(XS)*200, S)

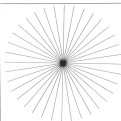
```

```

600 NEXT I
610 PRINT#2, "R";AC(1,1); ", ";AC(2,2)
620 C=2
630 FOR I=0 TO 4
640 K=0
650 C=C+1/10000 THEN C=C
660 PRINT#2, "C";C
670 FOR J=0 TO 8
680 K=K+1+1
690 IF K>10 THEN K=K-11:GO TO 660
700 PRINT#2, "O";AC(1,1); ", ";AC(2,2)
710 NEXT J
720 NEXT I
730 PRINT 4-2, "O";AC(1,1); ", ";AC(2,2)
740 PRINT#2, "H2,=200"PRINT#2, "C8"
750 PRINT#2,CHR(17)
760 END

```

Figure 1



PLOTTING  
ABILITY

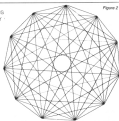


Figure 2

which has adequate polystyrene reinforcement, the GGP-220 is complete with power supply cord, a small supply of test paper and owner's manual. The ink packs, which should already have been installed, are said by Tandy to be capable of printing 4 million characters in black and 3 million in colour. Tandy's latest catalogue and price list shows the price of the black ink pack at £5.95 and the tri-colour ink pack at £3.95. Paper rolls cost £3.95 for a pack of three. While little emphasis is placed by the manual on the installation and removal of ink packs it is worth pointing out the possible dangers of removing them before they are exhausted. At least one person has tried this and suffered the consequences of an ink bath for his pains.

The mushroom-coloured plastic case measuring about 38cm by 30cm by 8cm is very solidly made with some of the flexibility evident on some low-cost printers. I had no incentive to interfere with the internal mechanism of the printer but am sure that if its external finish and fit is any indication the quality of construction is high. Supplied with both serial (RS232C) and

Centronics ports, the GGP-220 is compatible with all the Tandy range of computers as well as the Oregon 32 and quite a wide range of others. As ever, my advice would be to insist on seeing the printer connected and working with your own computer or one identical to it before shelling out hard-earned cash.

The GGP-220 uses the subtractive system of colour reproduction, similar to your colour negative (print) film, where the colours yellow, magenta and cyan are mixed in different proportions to produce all other colours. It is able to print both characters and graphics in seven colours — black, red, green, yellow, blue, magenta and violet. It offers standard or elongated characters, full addressable graphics on a resolution of 640 dots per line printing on plain cut sheet or roll paper. No provision is made, as far as I could see, for the pre-setting of either "top of form" or form length — important to some word processor programs.

The documentation supplied with the GGP-220 is quite poor compared with the normal high and informative Tandy standards. In view of the novelty of this

"hi-tech" approach to colour printing I was surprised to find that the manual had little to say about how the system works. It seems, in fact, that the ink is transferred in tiny quantities from the print head to the paper by means of a super fast high-density spark. Each dot of the matrix is formed by a separate operation and applied one dot line (640 dots) at a time. Seven passes of the head are therefore needed to build up a complete text line.

Used with the Tandy 16K Colour Computer a screen dump program is available. I would imagine that it can only be a matter of time before a similar utility becomes available for the Oregon 32. While quite slow, the screen dump is said to take between six and 20 minutes — the examples that I have seen have been most impressive.

Print speed is rather slow even in test mode at 37 characters per second (nominal). Even using the character dump built into the printer as a test mode I was unable to better 30 CPS (10 line x 60 dot character dump in about 27 seconds). In fairness most of the printer manufacturers seem to base quoted speeds on con-

►

# COMPUTERHOUSE

ANNOUNCE THE LAUNCH OF AN EXCITING  
NEW RANGE OF DRAGON SOFTWARE.

## BASIL GOES BALLOONING



The first of a series of adventures especially designed to be fun and comfortable for Basil. Again, the eccentric yet heroic star of these games. Can you help him Basil to elude the might of the dark ruler and his army of the most vicious only dragons against the economy? Armed with only a blunderbuss, and three hot air balloons, you must guide our hero into the city. All action machine code games, thoughtfully designed to be most difficult as you get better at it. £7.95.



## BOMBS AWAY BASIL

The next game in the series has Basil trying to defeat the bombs before he is attacked by his only brother-in-law, SPIDER BASTY, himself is really cool, and the cunning nature place spiders upon the Scarbe they plant. The first lot are pretty thick - and slow! But don't be fooled, they get very clever indeed. Also all machine-code with some of the latest graphics you have seen yet on the Dragon. £7.95.

## MXT I/O CONTROLLER

Specially developed for the Dragon Users Club.

To control your Central Heating, Alarm Systems, Train Set, Robot or anything which requires accurate timed control of external devices.

\* Simple-to-use Plug-in Card with support. \* Up to 4 devices can be controlled at once. \* On-screen timer Clock in 1/10, 1/100, 1/1000.

\* Easy-to-program in BASIC, with 2 New BASIC commands: CLOCK, CLOCK SET, CLOCK CHG SWITCH, SWITCH ON, SWITCH OFF & MONITOR. \* Useful I/O: Monitor for your MXT's programs.

\* Comprehensive User Manual with examples.

M20 - With 2 Relays & 2 TTL/CMOS lines £19.95.

M20A - With 4 Relay facilities £20.95. Plus 90p p. & p.

## FROM JCB MICROSYSTEMS SPEECH SYNTHESIS MODULE

Has already sold in large numbers throughout the U.K. and Europe. This cartridge module has unlimited versatility. Approximately 150 words are preprogrammed. Can easily be incorporated into existing BASIC programs. Up to 40 words can be spoken from one command. Manual supplied. £27.95.

## SOUND EXTENSION MODULE

This cartridge module allows your Dragon to create Music and Sound using his own voice. Has new built-in sound effects for games, etc. Easy to use via BASIC. Two I/O ports. Manual with examples. £24.95.

## BASIC ENHANCER/MERGER

This brand new utility, written by John Duffield, can save up to 80% of memory in a normally programmed BASIC program. It strips out REMs and unnecessary spaces, re-organises GOTOs and GOTOs and creates multi-statement lines, which can be longer than 255 characters, and will improve RUN Time. Cancelled/Programs facility. Only £7.95.

## DEALERS & OVERSEAS ENQUIRIES WELCOME

## THE DRAGON USERS CLUB

(Previously run by Games & Computers)

As from 14th March 1983, the Club will be run by Computerhouse LTD Ltd. During the past year the success of the Club (More over 2,000 members worldwide), it is necessary, in the first instance, all its members, for a larger organisation to handle its administration. All members will receive full details on shortly. Meanwhile, if you have any queries, please write direct to us at the address below.

## Order Form

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

TEL. No. \_\_\_\_\_

PLEASE SUPPLY:

QTY.	TITLE	TOTAL
<input type="checkbox"/>	BASIL GOES BALLOONING	£ 7.95
<input type="checkbox"/>	BOMBS AWAY BASIL	£ 7.95
<input type="checkbox"/>	MXT I/O CONTROLLER-2 RELAY	£19.95
<input type="checkbox"/>	MXT I/O CONTROLLER-4 RELAY	£20.95
<input type="checkbox"/>	SPEECH SYNTHESIS MODULE	£27.95
<input type="checkbox"/>	SOUND EXTENSION MODULE	£24.95
<input type="checkbox"/>	BASIC ENHANCER/MERGER	£ 7.95
TOTAL (ENCLOSED)		

NO CHARGE FOR POST & PACKING.

PLEASE SEND NO FURTHER DETAILS ABOUT JOINING THE CLUB ☐

CLUB MEMBERS MAY DEDUCT 10% BUT MUST ADD 10p PER ITEM P. & P.

ACCREDITED LAY-CHORD AMERICAN EXPRESS WILL CARD

Please state which type and give:

No. \_\_\_\_\_ Expiry Date \_\_\_\_\_

COMPUTERHOUSE LTD 15-20 LTD

7 Newnham Road, Beaconsfield, Bucks, HP8 1JG

Telephone: 0494 85418.

```

20 PRINT#2,"NORMAL CHARACTER"
25 PRINT#2, CHR$(37);CHR$(34);
30 PRINT#2,"ELOWGHTED"
40 PRINT#2, CHR$(27);CHR$(15);
50 PRINT#2,"BACK TO NORMAL"
60 PRINT#2,"NORMAL NOT FITCH"
70 PRINT#2,CHR$(27);CHR$(30);"BACK TO NORMAL NOT FITCH"
80 PRINT#2,CHR$(27);CHR$(30);"BACK TO NORMAL NOT FITCH"
90 PRINT#2,CHR$(27);CHR$(30);CHR$(22);CHR$(14);"THIS IS ELONGATED 1:1 RATIO"
100 PRINT#2,CHR$(27);CHR$(15);CHR$(27);CHR$(30);"BACK TO NORMAL AGAIN"
110 PRINT #2,CHR$(25);CHR$(30);"
120 PRINT#2,CHR$(27);CHR$(15);CHR$(1);CHR$(44);
130 PRINT#2,"THIS IS THE SOUTH NOT POSITION"
140 PRINT#2,CHR$(27);CHR$(34);CHR$(30);"THIS TEXT IS IN BLUE"
150 PRINT#2,CHR$(27);CHR$(34);CHR$(49);"THIS TEXT IS IN RED"
160 PRINT#2,CHR$(27);CHR$(37);CHR$(3);
170 PRINT#2,CHR$(128);CHR$(128);CHR$(128);
180 PRINT#2,CHR$(15);CHR$(35);CHR$(35);
190 PRINT#2,CHR$(1);CHR$(1);CHR$(1);
200 PRINT#2,CHR$(1);
210 FOR#481054
220 PRINT#2,CHR$(7);CHR$(34);CHR$(3);CHR$(25);
230 NEXT#

```

Figure 3

```

NORMAL CHARACTER,ELONGATED BACK TO NORMAL
NORMAL NOT FITCH
BACK TO NORMAL NOT FITCH
THIS IS ELONGATED 1:1 RATIO
BACK TO NORMAL AGAIN

```

THIS IS THE SOUTH NOT POSITION

THIS

THIS

THIS

THIS

THIS

THIS IS THE NOT BLUE MODE

Figure 4

■ Inuous repetition of the same character. By way of compensation for its slow speed the GCP-220 is extremely quiet.

Loading of either the roll paper or single cut sheets is straightforward. Care is needed, however, to ensure that the roll paper is correctly aligned to prevent hang-ups.

As with most modern printers, the GCP-220 is sent instructions in the form of control codes. Fig 3 is a sample program listing showing the way in which the various codes are used and Fig 4 is a sample of the results. Physical controls are in the form of a bank of three touch sensitive switches to handle On/Off line, FEED and RESTART (after replacing exhausted paper or jam) and three LEDs on the front of the machine for READY, ALERT and POWER. A lever is provided on the right-hand end of the carriage which locks and unlocks the carriage and also the ink nozzles and permits 'pumping' of the ink supply to increase the print density. On the back of the machine is a switch which allows a choice of 600 or 1000 baud when used with the serial I/F (also located

on the back together with the parallel I/F and the power supply socket).

A simple test routine, pressing the FEED button after unlocking the carriage, prints out a single, four-coloured, horizontal bar and allows a check to be made on the print density and ink supply. The normal routine of turning the power ON with the FEED switch held down outputs a multi-coloured 'barber's pole' character dump. Print density is, at best, poor. In the TEXT mode the individual dots of the matrix stand out very clearly and even in the bit image mode I was not impressed by either the resolution of the print or the density of colour. Certain types of paper, those with any sort of glossed finish or those which are very absorbent, seem to be incompatible with the type of ink used as smudged print or runs were detected on occasions.

Direct comparison of these two printers may be said by some to be unrealistic, bearing in mind the wide difference in costs and facilities. However, I am convinced that comparisons of this sort are valid. The MCP-40 and its cousins represent a very cheap, high-quality if some-

what slow solution to the problem of providing hard copy. As a worthwhile added bonus the good resolution and density of the colour output offers the small business the facility of providing multi-coloured graphs, pie-charts and so on. On the other hand the GCP-220 is, by comparison, far more expensive and possibly less versatile. Certainly for the home computer enthusiast the Tandy is, in my view, much too expensive. It may be more suitable for the small or medium size business but, if I were in the market for a new printer, I would certainly want to ask myself whether I really needed a colour facility when for considerably less money I would be able to get a machine like the Epson RGB80T. If colour was a prerequisite then I would also look closely at the new Seikosha GP700A, with its multi-coloured ribbon.

I have, in fact, as a result of the work for this article, purchased an MCP-40 for production of business graphics. The GCP-220, while extremely well built and robust, is unlikely to find its way into my stock of equipment. ■



# Time truck

Simon Rundell extends a

THIS GAME SETS you up in a truck (the yellow dot). The object is to get as far as you can, without running out of fuel or falling to pieces. Scattered along the highway are constructions and fuel tanks. When you hit an obstruction your damage tally is increased. The obstructions are the black dots. The fuel, indicated by a white dot, increases by a random amount.

The scrolling is done with a machine code subroutine loaded in at location 32001 (normal). It is called using the EXEC command. Using the EXEC command when a machine code program is not present causes the machine to crash. The assembler listing is given below (in DASM assembler shorthand):

LDX #3200  
LDY #3000

```

1  PD=1410H:P=3001:ST=0
2  CLC:PRINT#120,"          T R U C K
3  (C) RUNDULLOFT 1983"
4  FOR#1 TO 1000:NEXT
5  POS=1024+200+PD,143+140:POKE1024+320+PD,143+112
6  FOR #1 TO 500:STEP 10:NEXT
7  FOR #1 TO 100:POKE1024+RND(31),120:NEXT
8  IF RND(100)=1 THEN POKE1024+RND(31),143+64
9  EXEC32001
10 IF 3000 AND 3450 THEN ST=ST+1
11 IF ST=16 THEN PRINT#0,"DAMAGE WARN,";ST=0
12 IF 3050 AND 3100 THEN ST=ST+1
13 IF ST=5 THEN PRINT#0,"DANGER: Damage";ST=0
14 IF ST=10 THEN CLC:DOUBLE#5
15 X=CONST(100+IF X<10 THEN POKE1024+200+PD,143+112:POKE1024+320+PD,143+112:PD=PD+1
16 IF X=50 THEN POKE 1024+200+PD,143+112:POKE1024+320+PD,143+112:PD=PD+1
17 IF PEEK(32000)+128 OR PEEK(32000)+255 THEN DOUB#1
18 DIST=3000-10
19 IF 14=1 THEN ST=1
20 IF 14=2 THEN ST=2
21 IF 14=3 THEN ST=3
22 IF 14=4 THEN ST=4
23 IF 14=5 THEN ST=5
24 IF DIST=1000 THEN PRINT#0,"YOU HAVE COMPLETED STAGE";ST+1:PLAY"TG01C00C00C0
DOUB#1:ST=ST+1:DIST=0:P=P+RND(200)+50
25 P=P-211:P=0 AND P=50 THEN P=P+111:P=5 THEN PRINT#0,"FUEL WARNING";POKE102
4+RND(31),143+64:P=0
26 IF P=25 AND P=10 THEN P=P+111:P=5 THEN PRINT#0,"FUEL DANGER";POKE1024+RND(
31),143+64:P=0
27 IF P=10 THEN PRINT#0,"Fuel out";PLAY"TG01C00C00C00C0C";ST=5:43
28 IF PEEK(1024+200+PD)=100 THEN PLAY"TG01C00C00C00C0C";PRINT#0,"Abstraction";112

```







```

1000 IF P=0 THEN
1010 IF P=0 THEN
1020 IF P=0 THEN
1030 IF P=0 THEN
1040 IF P=0 THEN
1050 IF P=0 THEN
1060 IF P=0 THEN
1070 IF P=0 THEN
1080 IF P=0 THEN
1090 IF P=0 THEN
1100 IF P=0 THEN
1110 IF P=0 THEN
1120 IF P=0 THEN
1130 IF P=0 THEN
1140 IF P=0 THEN
1150 IF P=0 THEN
1160 IF P=0 THEN
1170 IF P=0 THEN
1180 IF P=0 THEN
1190 IF P=0 THEN
1200 IF P=0 THEN
1210 IF P=0 THEN
1220 IF P=0 THEN
1230 IF P=0 THEN
1240 IF P=0 THEN
1250 IF P=0 THEN
1260 IF P=0 THEN
1270 IF P=0 THEN
1280 IF P=0 THEN
1290 IF P=0 THEN
1300 IF P=0 THEN
1310 IF P=0 THEN
1320 IF P=0 THEN
1330 IF P=0 THEN
1340 IF P=0 THEN
1350 IF P=0 THEN
1360 IF P=0 THEN
1370 IF P=0 THEN
1380 IF P=0 THEN
1390 IF P=0 THEN
1400 IF P=0 THEN
1410 IF P=0 THEN
1420 IF P=0 THEN
1430 IF P=0 THEN
1440 IF P=0 THEN
1450 IF P=0 THEN
1460 IF P=0 THEN
1470 IF P=0 THEN
1480 IF P=0 THEN
1490 IF P=0 THEN
1500 IF P=0 THEN
1510 IF P=0 THEN
1520 IF P=0 THEN
1530 IF P=0 THEN
1540 IF P=0 THEN
1550 IF P=0 THEN
1560 IF P=0 THEN
1570 IF P=0 THEN
1580 IF P=0 THEN
1590 IF P=0 THEN
1600 IF P=0 THEN
1610 IF P=0 THEN
1620 IF P=0 THEN
1630 IF P=0 THEN
1640 IF P=0 THEN
1650 IF P=0 THEN
1660 IF P=0 THEN
1670 IF P=0 THEN
1680 IF P=0 THEN
1690 IF P=0 THEN
1700 IF P=0 THEN
1710 IF P=0 THEN
1720 IF P=0 THEN
1730 IF P=0 THEN
1740 IF P=0 THEN
1750 IF P=0 THEN
1760 IF P=0 THEN
1770 IF P=0 THEN
1780 IF P=0 THEN
1790 IF P=0 THEN
1800 IF P=0 THEN
1810 IF P=0 THEN
1820 IF P=0 THEN
1830 IF P=0 THEN
1840 IF P=0 THEN
1850 IF P=0 THEN
1860 IF P=0 THEN
1870 IF P=0 THEN
1880 IF P=0 THEN
1890 IF P=0 THEN
1900 IF P=0 THEN
1910 IF P=0 THEN
1920 IF P=0 THEN
1930 IF P=0 THEN
1940 IF P=0 THEN
1950 IF P=0 THEN
1960 IF P=0 THEN
1970 IF P=0 THEN
1980 IF P=0 THEN
1990 IF P=0 THEN
2000 IF P=0 THEN

```

$P = 0(3)$   
 $P1 = 0(6)$   
 $P2 = 0(9)$   
 instead of the last three of the first moves.

$P(3) = P$   
 $P(6) = P1$   
 $P(9) = P2$

after these  
 $P = 0(3)$   
 $P1 = 0(2)$

at the end of the second set of moves  
 $Q(7) = P$   
 $Q(4) = P1$

By doing the above none of the codes of colours in the arrays are lost when swapped.

Each of the 18 possible sets of array changes are calculated and made into subroutines of the program.

It is necessary to precode the arrays (jokes) with their correct colour at the beginning of the program (if the user is not continuing with a position saved in a data file on tape). This can be done in two ways, either randomly or with one colour (jokes) for each side (as with the finished cube).

## Disadvantages

Both ways have their disadvantages. If the second is used, the user must "imagine" the cube up himself before starting. If the first choice is taken, the program would have to be somewhat overcomplicated because a truly random starting point may result in a case that is impossible to complete.

For this reason I have decided to code each side with its own code number (colour) unique to itself.

It is important to be able to make moves quickly so it is necessary to choose clearly the keys which determine the moves. As I have said, the displayed cube has six vertical columns (from left to right V1, V2, V3, V4, V5 and V6) and three horizontal ones (H1, H2 and H3) — from top to bottom).

Pressing Q moves V1 up, A moves it down, R moves V2 up, S down, B moves V3 up, D down, F moves V4 up, P down, T moves V5 up, G down, Y moves V6 up, H down. So the QWERTY keys move the vertical columns up, ASDFGH move them down. Pressing 1 moves H1 left, 2 moves it right, 3 moves H2 left, 4 right, 5 moves H3 left, 6 right. So the 123 keys move the horizontal columns left, 234 move them right.

To muddle up the cube, press any of these keys randomly, then press the space bar and the cube to be solved will be drawn.

In the program, the INKEY\$ function is used to return the key pressed to a string variable.

Drawing the cube takes longer than the actual swapping of the contents of the arrays. Because of this I have decided that instead of the updated version being



[illegible]

- ➡ drawn after each move, the newer version should only be drawn if the space has been released

# The family favourites for your Dragon 32



## NEW RELEASES

**MYSTERY OF THE JAVA STAR:** Four part (over 100k) educational adventure for the older child. 3 levels of difficulty. Packed with challenges, puzzles and information. £7.95

**SHAPER:** Comprehensive sound effect utility. Create, store and modify machine code sound effects, for use in your own programs. Comes with a store of 100 effects and a comprehensive manual. £9.95

**NORTH SEA OIL:** Simulation game. Run your own oil rig and see how fast you can make 100 million dollars! £5.75

<b>PETE'S PROGRESS DIARY:</b> Epic 70k adventure for the whole family. Packed with features.	£7.95
<b>EMPIRE:</b> Highly praised strategy game.	£6.95
<b>PUZZLE:</b> Figure puzzle game. 3 levels.	£6.95
<b>HORRIBLE:</b> Entertaining fishing game. 100 players.	£5.75
<b>PICTOGRAMS:</b> Memory based education for 4-12 years olds.	£6.95
<b>REVERSED SQUARES:</b> Memory based education for 4-12 years olds.	£6.95
<b>FAMILY PHONICS:</b> Games/education utility.	£6.95
<b>PETE'S GAMES:</b> Games/competition for all ages.	£6.95
<b>LIVE &amp; LEARN:</b> Educational companion for older children.	£6.95
<b>QUICK PACK:</b> Two quiz games. 500 words.	£3.95
<b>INFANT PACK:</b> Preschool education. Counting and alphabet.	£3.95
<b>JUNIOR PACK:</b> Primary school education.	£3.95

**DEALERS:** Please us now  
on 01-514 4871 for our  
comprehensive catalogue



Available from selected branches of Boots and all good stockists, or by telephoning Access/Hartleycard orders to 01-514 4871 or by sending cheque/P.O. to: 119 ETON ROAD, H.FORD, ESSEX, IG1 2UQ.

# OM doesn't live here any more

*Pam D'Arcy introduces the Basic shuffle*

THIS ARTICLE represents an in-store investigation to help you improve your own programming techniques, banish the OM error syndrome, and make the best use of available store. Out of a desperate need to make the most of the available memory in programs such as Dragon Data's Database, I offer you the fruits of my research which takes the guesswork out of allocating your data storage areas.

## Dividing

If I begin by dividing the Dragon's memory layout into five areas, A to E, A is the 1536 bytes reserved for running any Basic program. B is an optional area between zero and 13280 bytes which is reserved for up to eight graphics pages. When newly switched on, four pages (8144) bytes are reserved by default. Typing in PQLBANK1 will reduce this area to one page (1936 bytes). PORE25.6-NEW removes this last page (actually leaves one byte).

C is the actual Basic program — its size is dependent on program and user requirements (August's issue gave an insight into how Basic statements are held in store and the memory taken up). D, the memory available for data storage, is the subject of this article, while E is the nominal 1 byte reserved by Basic unless user-written machine code subroutines are used.

In fact, Basic further subdivides area D between simple variable and array table pointer storage (which I will call areas F) and string storage (G).

The size of area D is that of the last valid CLEAR statement issued. When first

switched on, 200 bytes are reserved by default. RESET alters by the last valid CLEAR statement issued. CLEAR0 is valid. As its name suggests, this area is dedicated for use of string (S) variables.

Area F itself is further subdivided. Any used space commences at the lowest address (= end of program address + 2) and is used contiguously upwards, resulting in this arrangement: simple variables (H), array pointer tables (I), unused space (J). The top of area J is, except for a few further bytes reserved by Basic, what is returned as the MEM value at any one time.

Thus when first switched on, the map of areas A to J is as shown in Diagram 1, with MEM (= available J area) giving you 24671 bytes. CLEAR0 reduces G to nil. PORE25.6-NEW reduces B to 1; sets start value of C to 1537. MEM will now give you 24715 bytes.

To go back to area F, simple variables are any variables that are referred to without a subscript. Arrays are any variables referenced with subscripts.

Thus if a program refers to a variable AS and a variable AS(I), two quite separate locations would be used by Basic when storing information in those fields, a simple variable location and the other referenced via the array pointer table. The simple variable and array table pointer areas are extended as each new variable is encountered during program execution.

Each item has a specific layout as touched upon in the August issue — see Diagram 2. The address of the string will

point to a location in the Basic program (eg AS = "FIELD NAME") then Basic doesn't waste space by copying "FIELD NAME" to a location in the string stack but instead points the variable directly to its occurrence in the program area, generally referred to a "preset" data. Or it will point to a location in the string stack, eg INPUT # -1 AS sets the data read off the file in the string stack and the simple variable storage points to this location.

Array pointer table storage is arranged per named array as seven bytes overhead plus per subscript item (including 2) five bytes, eg DIMAAA(4) takes up  $7 + (5 \times 4) = 27$  bytes. The five bytes per item are laid out as 16 bytes to six of the simple variable storage shown in Diagram 3.

If Basic encounters a subscripted variable that has not been the subject of a previously encountered DIM statement, it automatically sets up an array pointer table assuming 11 entries (ie DIM varname(15)).

## Shuffler

Basic is a better shuffler than any card sharp could be. As mentioned above, the simple variable and array pointer table storage area is used contiguously from the lowest address, simple variables preceding arrays.

Thus if an array is defined with simple variables not appearing in earlier DIM statements, every time that Basic encounters a new simple variable, the array pointer tables are shuffled along to accommodate the new simple variable. For example:

```
100 DIMAS(1000)
...
1300 FOR V = 1 TO 1000:NET V:REM
TIME DELAY
1320 FOR D = 1 TO 6
1340 AS(D) = AS(D + 1)
1360 NEXT D
```

then the pointer table for the only array (AS) would be set up at the lowest available address. When the variable V is encountered for the first time during execution, the array pointer table is moved along seven bytes to accommodate the new simple variable. When the variable D is encountered for the first time, the array is moved on a further seven bytes etc. ▶

0-1535	1536-7679	7681	7683	32566	32767	
A	4 pages	2 x null bytes	D		E    1 byte	
			F			G  200 bytes
			H-1 nil	I		

Diagram 1: the map of areas A to J when first switched on

# SUPERIOR SO

## EDIT +



- EDIT+ is a Full Screen Editor and Programmer's Tool Kit. It's an excellent aid for writing programs in BASIC and is easy to use for the novice as well as the experienced programmer. EDIT+ includes all the facilities of HI-RES. Up to 23 lines of your program are displayed on the screen and can be changed by overtyping, inserting, or deleting characters. Functions include: Find String, Change String, Copy Text, Goto Specified Line, Scroll Up/Down, Append From Tape and Enter Basic Command. No Dragon is complete without an EDIT+. £34.50

## HI-RES



- Plug the HI-RES cartridge into your DRAGON and you will immediately see the improvement. The screen displays 24 rows of 51 characters with proper lower case and BASIC works as normal but with extra features: Selectable character sets (English, French, German, Danish, Swedish, Italian, Spanish), SPRTG Graphics, Redefinable Characters, Improved keyboard action with autorepeat allows faster typing, Graphics and text can be mixed on the screen. Suitable for educational and business use. £25.30

## SOURCE TAPES



The following programs contain both source and object code. They can be used in conjunction with "DASM" or on their own as individual programmes. It's a great way to build up your software library. Each tape represents excellent value at only \$5.99 each.

1. DISASSEMBLER
2. GAME OF LIFE
3. HI-RES SCREEN DUMP FOR EPSON
4. HI-RES SCREEN DUMP FOR SMD214

## DASM



DASM is a versatile assembler, designed especially for ease of use on the DRAGON and allows you to assemble machine code while still retaining the full use of BASIC. Supports all 6804 instructions and modes. Allows any length for labels (the first 5 and the last characters are used), full support for output to printer. Recommended for the beginner. £38.95

## DEMON



A powerful machine code monitor which allows you to delve into the internals of your DRAGON as well as helping you to debug your machine code programs (and BASIC programs using PEEK and POKE). Includes: Examine/Change memory, Examine/Change registers, Print Screen, Set Breakpoints, Test Memory. An essential tool for all machine code users. £38.95

## DASM/DEMON



- It has all the features of both DASM and DEMON in one package. DEMON is the natural partner to DASM, complementing each other perfectly. Write, test and use your programs without the bother of reloading. It is extensively featured in the new book by Ian Sinclair on Dragon Machine Code. It is the ideal combination for the machine code user. £30.45

**VISIT YOUR NEAREST STOCKIST OR FOR FAST MAIL ORDER SERVICE**



# SOFTWARE

## GRAPH DRAWER



For HI-RES or EGT+, draws bar charts, direct to screen and printer. Print module for Epson MX or FX printer included. Introductory offer of £14.95 if purchased with HI-RES or EGT, £19.95

## EXTRAS



**DUST COVER** inc P&P £2.99  
**PRINTER LEAD** inc P&P £14.95  
**MONITOR/SOUND LEAD** inc P&P £3.99  
**Super inexpensive 14 inch Colour Monitor with integral sound lead for DRAGON and most other applications** only £225.00  
**DRAGON DISC DRIVE complete** inc P&P £269.00

## BOOKS



**Books and Extras**  
 Introducing Dragon Machine Code by Ian Sinclair £7.95  
 Advanced Sound and Graphics £5.95  
 The Working Dragon 32 £5.95  
 Programming the 6809 Z80 £12.50  
 6809 Assembly Language Prog. £12.50  
 Leverthal  
 Postage on books: 50p per book except Z80/Leverthal £1 maximum £1.50

## BUSINESS SOFTWARE



The following **BST** programs are now available for use on cassette with the HI-RES 51 by 24 Screen Database, Business Accounts, Stock Control, Invoices/Statements, Mailer/Address Book.  
 Also available: Home Accounts, BST Calc. £19.95

**BECKING**  
 Software Centre, 124 Burnham Road (CE8) 44713  
**BENTON/VALE**  
 The Cambridge Graphics Superstore, 1st Floor, 224 High Street, Brighton (BN1) 2BQ  
**BIRD CO.**  
 Bristol Computers (UK), 24 Park Row (CV1) 29488  
**CLARKE**  
 Hagen/Hagen (Main House, 18, Ashby Street, Ashbourne) (LE19) 4259  
 First Rate Computers, 10 Main Centre London Road, Derby (DE1) 49580  
**COOPER**  
 Gann & Computers, 1 North Street, Warrington (W9) 255  
**COSE**  
 The Service Users Software Centre, 41 Wellington & Marley High Street, Charnock (44) 54111  
**CRABTREE**  
 Commercial & General Transport Co., 4th Lyndford Road, Farnborough (H9) 54479  
**HEATHCOTE/DAVE**  
 G.A. Computers, 2 West Square, Birmingham (B4) 6001  
**HELAND**  
 Data Bank, Maple House, Gurnham Road, Sudley (SO10) 188284  
**HOVE**  
 Hovey Computers, 145 New Road, Chalfont (CH4) 87508  
 Mobile Computer Ltd., 121 St. John's Road, Tynbridge Wels (W9) 4344  
**LANCASHIRE**  
 Mack Electronics, 11 Bay View Road, Prestwich, Manchester (M26) 799103  
**HOME COMPUTERS**, 204 Church Street, Blackpool (L1) 2240  
**LONDON**  
 Muller Music Shop, 100 Westminster High Road, (W6) 150  
 (01) 749 5000  
 Murray Music Systems Ltd., 24 Baker Street (W4) (01) 885 7671  
**WILD LIFE**  
 Wireless Communications, 125 High Street, Farnley End (01) 805 1434  
**WORTHINGTON**  
 R.R.B. Computers Ltd., 26 Andrew Street, Luton, (01) 458 (0444) 584  
**NOTTINGHAM**  
 Computer Market, 27 Sovereign, Nottingham (NG1) 184414  
**SCOTLAND**  
 Livingston Computer Centre, 17 The Mall, Livingston, West Lothian (W16) 3474  
**SOMERSET**  
 Compulink Ltd., 8 Central Parade, St. Nicholas, Taunton (01) 390 5055  
 Software Ltd., 214 High Street, Sutton (01) 445 7044  
**SURREY**  
 Gann, 24 Gloucester Road, Brighton (CV1) 288424  
**WAGG**  
 WaveData Ltd., 1st Colwyn Road, 70 Park Street, Marylebone, London (W1) 491111  
**WATFORD**  
 Progression Computers, March Street, Watford (WD1) 448440  
**WILTSHIRE**  
 Compulink Ltd., Thea House, Ludlow, Shropshire (W9) 448440  
**WILTSHIRE**  
 Wiltshire Data (Canada) Ltd., 135 Main Street West, Suite 302, Toronto (416) 447 9012  
**WYRE**  
 The Computer Machine Centre Ltd., 1 Haysom Street, The New (W1) 20944  
**WYRE**  
 Information Systems, 11, Sharncliffe, Bala (W1) 20944  
 Available at selected branches of Books

CONTACT COMPUSENSE (Please add 50p p&p per order)

**COMPUSENSE LIMITED**

Box 369, 1880 Green Lanes, Palmers Green, London N13 4HT (01) 832 0485/0486/0487  
 Telex: 833171 COMUS G  
 Fax: 833171 COMUS G

March 1984 Dragon User 28

# NEW FROM MICRODEAL TELE-FORTH

## *A Step up from Basic*

### TELE-FORTH FOR THE DRAGON 32 a new high level language for the DRAGON 32

Tele-forth, a figForth Compiler has an execution as much as 10 to 20 times faster than Basic which makes for faster programming, highly modular for easy testing and de-bugging. TELE-FORTH has been especially customised for the THE DRAGON 32, and is a full figForth implementation with added words to give the ease and use of a full screen editor with extra structuring statements (case etc.), Auto keyboard repeat together with full cassette and printer handling. *Microdeal Tele-forth comes complete with its 20 page tutorial to guide you through the basics of the Forth language.*

AVAILABLE FROM DRAGON 32 DEALERS  
NATIONWIDE or direct from

**MICRODEAL LTD.**

41 Truro Road, St Austell, Cornwall PL23 5JE.

24 hour orderline: **0726 3456**

**£19.95** includes post & packing



Send 1st Class stamp for our  
new catalogue for the  
Dragon 32

*Selected Microdeal programs  
available from larger  
branches of*



DIVIDE	0	1	2	3	4	5	6
STORAGE	2 CHAR. NAME, 2nd. CHAR+888 = 888 LAST 88	CHAR. LEN. OF THE STRING CONTENT	NULL	ADDRESS OF STRING CONTENT	NULL		
PARAMETER	2 CHAR. NAME		ACTUAL VALUE IN EXPRESSIONAL FORMAT				

Diagram 1: each item has a specific layout

0	1	2	3	4	5	6
2 CHAR. NAME		Total len. of this array		888	highest subscript + 1 i.e. actual num of items?	
AS ABOVE						

Diagram 2: simple variable storage

4 The string stack is used in the opposite direction, ie from the highest address down. Any time that a string variable is adjusted, a new string stack location is set up (again, see August's issue). Although it was previously a string contained in the stack, the old content remains there. However, when Basic encounters insufficient space in the stack for further new values, it "cleans up" the string stack, discarding redundant data and "shuffling together" currently active data in order to reuse the formerly-redundant area.

The implications should now be becoming clear. OM may occur during a program when executing a CLEAR, executing a DIM, or coming across a new variable even well into processing.

If all variables are presented to Basic in DIM statements following the CLEAR, OM will not occur in the middle of a program run, as the maximum required data storage area will have been satisfactorily allocated prior to entering the main processing routines.

If simple variables are presented before array variables, it avoids wasting processor time in shuffling up array pointer tables to accommodate newly encountered simple variables. If array variables are DIMmed to their required size, space is not wasted on small arrays by the 80 default.

We should now know enough about balancing arrays versus string space to take the guesswork out of the amount to CLEAR, the number of records our programs can accommodate, etc.

Having switched on the machine and decided whether or not to use the POKES,AMEM combination, CLCAD the program. If not using the POKES256, PCLEAR is appropriate (in the same as the PCLEAR in your program if you are using cool. CLEARDIMMEM to discover the total amount of space this version of the program has available for data storage. Discount a certain amount for simple variables (if they are DIMmed, it is a simple task to count them up and multiply by the seven byte length each occupies). Discount a further 100 bytes of "workspace"

for the Basic interpreter.

Knowing that each array used has an overhead of seven bytes plus five bytes (or possible subscript) (not forgetting zero), the amount of planned array pointer storage can now be calculated, leaving you with a valid CLEAR figure. Seeing how much space you have for string storage is where you then need, if necessary, to juggle between your requirements of array space (ie number of records you can cope with in any one run) and string space (ie actual string data storage).

But if you have followed the reasoning of this article, you can see that you can now plan with confidence, avoiding OM errors and maximizing the use of available memory on either than a trial and error basis — as I had previously employed.

## Gills

Unfortunately, avoiding OM errors will not make the program foolproof against OS errors if you try and fill it absolutely to its gills or if your "average" record size has been exceeded on this occasion. I have thoughts on getting over this problem without losing the data — but perhaps that had better be discussed in another article, not now.

A practical way to illustrate the points made here is with the Database program from Dragon Data — which is, in the Dragon Special Selection 2 cassette.

I find this program quite useful for different things and have standardised my own program data file formats to its format in order to benefit from its facilities. However, following the instructions supplied, I find 200 records restrictive for the type of files that I want to hold — and if you follow the given advice on increasing this to 500, the dreaded OM occurs.

The program contains no PCLEAR statement, so having switched on the machine and loaded the program, MEM is 17652. Add the 200 bytes already CLEARed by default so 17852 bytes of storage are available for data storage as the program stands.

Three of the program lines are:

110 CLEAR14000

..

120 M=200

..

..

100 DIMA\$(M/FTS(10,AA\$(M+1))

M = the number of data items allowed in the database (= 200 x 1 field records: 100 x 2 field records etc).

Roughly, there seems to be less than 100 bytes of simple variable storage required. The fixed size array table (FTS(10) requires 7 + (11 x 5) = 62 bytes. Therefore 17852 - 62 leaves just under 17790 bytes to balance the number of records versus string space.

Following the instructions regarding amending the M value to 500, resulting in a database of 500 records x 20 characters (= 10000 bytes cleared — the way I would have approached it too, before understanding the storage set up:

AA\$(M) array requires 7 + (501 x 5) = 2512  
AA\$(M+1) requires 7 + (502 x 5) = 2517  
Total bytes = 5029

CLEAR14000 + AS and AA array storage  
5029 = 19429 bytes.

Not surprising that with only 17700 bytes at our disposal, an OM error occurs. PCLEAR1 before RUN would easily resolve this.

Database can be tailored to one's own needs. Take a requirement of two fields per database record, field one averaged 64 characters, field two averaged five, giving a total of 69. There are the two arrays per item, so 2 x 2 fields x 5 bytes (per array field) = 20 characters — or 69 characters per record.

With PCLEAR1, 20480 bytes are available for data storage. Being generous by leaving the odd 360 bytes for Basic, other variables and FTS(10), leaves space for 22100 - 69 = 24613 records. Thus, the AS and AA array space for 200 (0 to 249) records would require:

	bytes
AS 249 records x 2 items x 5 =	2490
AA 249 records x 2 items x 5 =	2490
Sub-total =	4980
Plus array overheads 2 x 7 =	14
Total =	4994

Thus 22100 - 4994 = 17106 bytes are available for CLEAR, while 17106 bytes / 64 usable records = average string size per record of 68.3 characters. This reflects, very reasonably on the commissioning requirements, not forgetting that some string storage space will be needed for field files, keyboard input and other file and pieces.

The possible database of 247 = 2 field records averaging 69 characters per record is a far more attractive proposition than at first seems possible from the accompanying literature. However, despite the usefulness of the Database program, I have in fact developed a complementary program to make up for its deficiencies in some areas, notably record editing, merging of files and inserting records in the middle of unsortable files. It is available from Pancomics Ltd, 21 Wycombe Lane, Woodson Green, High Wycombe, Bucks, price £3. ■

# What's your best source of information on color computing?



Now you can improve your color computing skills... and it's easy to do. **HOT CoCo** gives you more practical information on the Dragon\* than any other publication. Nearly 150 pages a month!

Every issue is packed with exciting new things for you to do. We won't waste your time with filler stories. You'll get instructive columns:

- Kluge's Arcade**—enjoy old-fashioned arcade-style games on your computer
- The Basic Beat**—learn everything you need to program in Basic
- The Educated Guest**—discover how to use your computer as a teaching tool
- Doctor ASCII**—get answers to your technical questions
- Graphically Speaking**—create eye-catching designs that add appeal to your programs

You also get a **Short** easy-to-understand article every month: Games... utilities... programming techniques... tutorials... graphics... education... hardware projects. They'll help you expand what you can do. And complete program listings show you how to use what you learn.

That's not all. **HOT CoCo** saves you money too:

- Careful reviews** help you make every purchase a sound investment.
- Informative ads** let you comparison-shop from home.
- New-product announcements** tell you what's available before it reaches the stores.

With all this at your fingertips, your subscription could pay for itself with one wise purchase.

And **HOT CoCo** is risk-free. If you don't like your first issue, just write "cancel" across the invoice and return it to us. You won't owe a thing.

Subscribe to **HOT CoCo** today. Twelve big issues are only \$44.97 (US funds drawn on a US bank). Simply fill out the coupon below and return it right now to: **HOT CoCo Subscription Dept., PO Box 978, Farmingdale, NY 11737, USA.**



\*Dragon is a registered trademark of Dragon Data Ltd.

**YES!** Help me improve my computing skills. Send me 12 issues of **HOT CoCo** for \$44.97 (US). I understand that with payment enclosed or credit card order I will receive a **FREE** issue, making a total of 13 issues for \$44.97 (US).

Get a 13th issue **FREE** when you include payment or charge it on your Mastercard, Visa, or American Express.

☐ CHECK/MO ☐ MC ☐ VISA ☐ AE

CARD # \_\_\_\_\_ EXP. DATE \_\_\_\_\_

SIGNATURE \_\_\_\_\_

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

POST CODE \_\_\_\_\_ COUNTRY \_\_\_\_\_

**HOT CoCo • 50 Pine Street • Westbrook, ME 0409 • USA**

**73E2FDU**

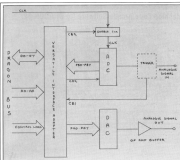


Figure 1 — *Illustration of the research design*

[illegible]

## Adding more scope

**A G Hanson** moves on to explain applications for the interface which was introduced last month

NUMA PCAD applications of the analogue-digital interface described last month will undoubtedly suggest themselves to the interested user, but one which is quite interesting is its use to convert the Dragon 20 into a simple storage oscilloscope.

Basically, a mode of operation is as follows. Under software control the ZN4301 ADC samples the incoming analogue signal 2561 times. The values reconstructed from these samples are stored in a table 2048 bytes in length starting at address 5017051. Then by means of suitable software a graphical representation of the original analogue signal is drawn on the Cragson graphics screen, where it may be stored or at least shown. A simple 'time-base' effect is produced by interposing a variable software delay between each successive sample of the analogue signal. It should also be possible to utilize the 8522 timer to effect this delay. The longer the delay, the slower the 'time-base'. Note that the delay is fixed in the case of the 'fast time-base' to give a trace approximately 15 milliseconds in length.

As a guide to how the storage scope may be implemented, see Programs I and II. Program I is the main program and II is an assembly listing of its machine code portion.

## Timeline

The box marked "trigger" in Figure 1 appears in detail in Figure 3b. It is used in conjunction with the storage scope program (jobs must be taken when handling the CD 48104 as it may be damaged by static electricity). By choosing the trigger option the ADC will not commence its conversion cycle until the incoming signal activates the trigger circuit. Thus it is possible to examine transient wave forms or non-repetitive events. A means of adjusting the level at which the incoming signal will trigger the ADC is provided.

Lines 80-100 in program 1 relative memory, load the 80829 register contained in the data statements, and initialize the 8022 VIA. The user is then presented with two options. These are those "time-base" speeds, a simple trace expansion facility and output data to the DAC. After choosing a time-base speed the user is presented with the trigger option, together with information on preserving or clearing the trace, before returning to the time-base options.



100

The TRS-80 Colour Computer Technical Reference Manual should be available from any Tandy store. It is reasonably priced and packed with information, much of which is relevant to the Dragon 50. Data sheets on the Z8002 ADC and Z8008

# screenplay



134 St. Vincent Street, Glasgow G2 5JU. Telephone 041-248 2481

## MAD MONTY

IT'S MEALTIME FOR MONTY . . . . .  
AND FROGS ARE ON THE MENU !!

GUIDE THIS RAVENOUS PYTHON  
AROUND THE GARDEN GULPING FROGS  
AND MUNCHING MAGIC MUSHROOMS  
BUT BEWARE OF THE POISONOUS  
TOADSTOOLS.

KEEP YOUR COOL AND YOU MAY CATCH  
A SPEEDY MOUSE FOR A DESERT!

## THE ANIMATOR

IS YOUR DRAGON QUICK ON THE  
DRAW? . . . .

CAN YOU "DO A DISNEY"? . . . .  
NOW, THE ANSWER IS YES!!

WITH THE FLICK OF A CURSOR YOU  
CAN CREATE YOUR OWN FULL COLOUR  
CHARACTERS AND WATCH WITH  
AMAZEMENT AS THEY SPRING INTO  
LIFE IN YOUR VERY OWN USABLE  
ROUTINES.

FROM SPREADING PALMS TO SPEEDING  
SPACECRAFT . . . THE LIMIT IS YOUR  
OWN IMAGINATION!

PRICE: £7.95

PRICE: £9.95

Available by Mail Order, from **SCREENPLAY**, 134 St. Vincent Street, Glasgow G2 5JU.  
(Checks payable to **SCREENPLAY**)



**If you've ever been killed by  
the evil goblin, flamed  
by a dragon or turned to stone  
by a wizard...**

then you need **Micro Adventurer** - the new monthly  
magazine devoted to all microcomputer  
adventures, war games and simulations.

Each issue offers a wide range of stimulating features, including:  
■ **Helping and Contact columns** ■ **Reviews of the latest adventures**  
■ **Competitions with exciting prizes** ■ **Useful gaming advice**  
■ **Adventures to type in and play** ■ **Profiles of famous adventurers**  
■ **Advice on how to write your own adventures**

If all this sounds too good to be true then fill in the form below to make sure  
you receive your copy of **Micro Adventurer**.

### **SEND NO MONEY NOW**

Name and full address of your subscription of **Micro Adventurer**,  
beginning with the

Name \_\_\_\_\_

Address \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_



This order should be accompanied by a cheque made  
payable to **Micro Adventurer**.

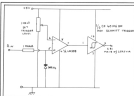
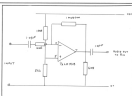
#### **(UK subscribers)**

A year's subscription (12 issues) - please send the form with  
payment to **Micro Adventurer**, Subscription Department,  
Creative House, Pennywell, Newcastle-upon-Tyne, Tyne and Wear, NE10 1JF.

#### **(Overseas subscribers)**

A year's subscription which includes postage is £20.00 - please  
send the form with payment to **Micro Adventurer**, Subscription  
Press International, 205 East 42nd St., New York, NY 10017.



[illegible]

\_\_\_\_\_

1. 在 `main` 函数中，定义一个 `int` 类型的变量 `a`，并赋值为 10。  
 2. 在 `main` 函数中，调用 `swap` 函数，将 `a` 的地址传递给 `swap` 函数。  
 3. 在 `swap` 函数中，定义一个 `int` 类型的变量 `b`，并赋值为 20。  
 4. 在 `swap` 函数中，将 `a` 和 `b` 的值进行交换。  
 5. 在 `main` 函数中，输出 `a` 的值。

```

#include <stdio.h>

void swap(int *a, int *b) {
    int temp = *a;
    *a = *b;
    *b = temp;
}

int main() {
    int a = 10;
    swap(&a, &a);
    printf("a = %d\n", a);
    return 0;
}
    
```

运行结果：  
 a = 10

解释：  
 在 `main` 函数中，定义了一个 `int` 类型的变量 `a`，并赋值为 10。然后调用 `swap` 函数，将 `a` 的地址传递给 `swap` 函数。在 `swap` 函数中，定义了一个 `int` 类型的变量 `b`，并赋值为 20。然后将 `a` 和 `b` 的值进行交换。最后，在 `main` 函数中，输出 `a` 的值，结果为 10。

[illegible][illegible]

SAC are obtainable from Fernand Electronics, Pkwy. New Road, Chatterton, Oldham, OL8 5BP

For the MC6809E CPU MC6860 SAM, MC6847 VDG and MC6801 PIA, by the European Literature Centre, Motorola Semiconductors, 88 Turners Drive, Balaclava, Milton Keynes. And for the 6823 Versatile Interface Adapter by Spiretek, Honeywell, Honeywell House, Charles Square, Bradford, Yorkshire, FG12 1ES, or Electronic Devices Division, Rockwell International, Heathrow House, Bath Road, Cornhill, Middlesbrough.

Three useful books are **MC68000**, **MC68000: Microprocessor Programming Manual** which is published by Motorola and is obtainable from Macrolibrating, Burnham Lane, Slough, SL1 6LN; and **Micro-Processor Interfacing and Micro-processor Interfacing Advanced/D & D** which are by Joseph J Carr, published by T&H Books Inc. These should be obtainable from any good computer bookshop. Photocopies of my previous article can be obtained by sending a stamped, addressed envelope to Dragan Gusev.



# The latest word on i/o routines

John Botbol puts the record straight on input/output

INPUT/OUTPUT ROUTINES on the Dragon would seem an unlikely area for controversy, but the dust is only now settling following the publication of an article on the subject last year. Ian Hickson's article was met by a series of letters which are still being received, with claims and counter-claims flying back and forth. Here I'll try to present a clearer appraisal of some of the areas of confusion.

Regular readers may benefit from referring to the July issue of *Dragon User* which contained the original article — and to the September and November issues for the subsequent correspondence.

I'll begin by looking at input/output locations and then consider exactly what an interrupt is. There are 32 memory locations set aside for future expansion. The SAM chip provides an enable (low) signal for the entire block. This is used in conjunction with the lower address lines to decide space for up to eight PIA's or any other such requirements as may be deemed necessary. There are also 16k bytes of memory in the cartridge space into which IO can be mapped.

## Valid

An interrupt itself (as usually found) is a means of stopping the CPU, by an external signal, in order that a service routine may be carried out. When a valid interrupt signal is received, the CPU will complete its current instruction cycle and then save either its set of registers or a part-set of registers before calling a routine from a fixed vector which is always the same for any 6809 processor. In the Dragon the interrupt vectors are remapped into the ROM area of memory by the SAM chip. The very nature of the word "interrupt" describes its function well. Software interrupts, although they save the registers and behave in a similar way to hardware interrupts, are not directly triggered by external signals but by polling in software.

There are two major differences between CPU interrupt handling and PIA interrupt handling. First, CPU interrupts are enabled by setting the relevant OC flag low, while PIA interrupts are enabled by setting the relevant bit of the PIA control register high. Second, while a PIA interrupt output may be disabled, the input (if enabled) will still accept an interrupt input and will remember it by setting bit 6 or 7 of the control register. This means that inter-

rupt inputs may be examined at the whim of the programmer, and conditional statements may be used to determine the end result of the interrupt. A CPU interrupt fed directly to the CPU chip will not remember any interrupts which may have occurred while it was disabled.

The control lines (CA1, CA2, CB1, CB2) on a PIA may all be configured as inputs. However, CA2 and CB2 may also be programmed as output lines. All four lines have various modes of operation for strobing inputs and for handshaking purposes. CB1 is not an interrupt enable but an interrupt line which is programmed and enabled/disabled from the control register.

The joystick routines work by outputting a number on to the D/A converter and comparing the analogue voltage produced with the analogue voltage being generated by the relevant joystick potentiometer. The number output to the D/A converter is changed until the comparator changes its output, at which point the current value being input to the D/A converter may be taken as the joystick value.

The cassette relay is in no way connected with any interrupt routines. Neither is there such a thing as a printer relay. The cassette relay is operated by setting CA2 (BFF21) manually high. This line then operates a transistor switch which then drives the relay. Closing bit 5 of the control register (BFF21), as suggested in the original article, will configure CA2 as an input line which makes little sense as the hardware requires it to be an output line in order to drive the relay.

Sound is not simply generated by feed-

ing numbers to BFF20 as Ian suggested but by controlling the frequency of the program loop which is generating the sound. The value of the numbers which are used to generate the analogue output will relate to the volume of the output.

And bits 0,1 of BFF20 do not "indicate that a cartridge is present". As stated earlier in this article CA1 and CB1 may only be used as input lines. Bits 0,1 of the control register are used to configure the input line as required. Bit 0 is cleared to disable the interrupt input and set to enable it. Bit 1 is cleared to activate the interrupt flag on a high to low transition on the input line and is set to activate on a low to high transition. If Bit 0 is cleared and a valid signal was applied to, say, CA1, then Bit 7 of the control register will be set to indicate that an interrupt has been received. If Bit 0 was set, in the above situation, then not only would Bit 7 be set but the interrupt output from the PIA would also go low, thus providing a hardware interrupt to the CPU. This is how the cartridge initialization works, since the interrupt output from the PIA is directly connected to the PING input on the 6809.

## Virtually

Finally (eventually?), with reference to Ian's letter of defence in the November issue, his short program would be very confusing to a reader as it is written in Z80 format rather than 6809. The instruction LDA (BFF21) is virtually meaningless as it indicates indirect addressing mode in 6809 terminology. The entire program makes little sense as any interrupt input to a PIA will set flags at bits 6 and 7. Therefore, comparing the contents of BFF21 (even in extended addressing mode) with #B1 will prove nothing except that CA2 has been programmed as an input line and it will respond to a low to high transition, and that CA1 is disabled but will set the interrupt flag on a high to low transition on that line.

The correct program to switch on the relay is as follows:

```
LDA BFF21
CPA #B08
STA BFF21
```

and to switch off the relay:

```
LDA BFF21
ANDCA
STA BFF21
```

To test the relay state, use the following:

```
LDA BFF21
ANDCA
CPA #B08
BNE RELOFF
SWI
```

RELOFF RTS

This will call the interrupt routine from SWI vector when the relay is on. INCA could not conceivably switch on a relay as it is connected to the Dragon's PING pin.

In conclusion, may I suggest that anyone interested in this subject should obtain a suitable reference book on programming the 6821 PIA, and also the manufacturer's data sheet. These should provide the necessary information to enable users to complete their understanding of the subject. ■



Dragon's 6801 PIA chip

## A VERSATILE 14" COLOUR MONITOR (WITH SOUND) FOR YOUR DRAGON

### A JLC COLOUR MONITOR WILL:

- ★ provide vastly improved display clarity and performance for cleaner, crisper images
- ★ be a neat, compact and professional product that represents remarkably good value for money
- ★ have adaptability with a simple input connection switch for your Dragon c. video input or any RGB input
- ★ be compatible with all popular microc, video recorders, videofix adapters and cameras
- ★ be designed and made in England
- ★ Fully guaranteed
- ★ Money back if not completely satisfied



Model 3373FC5M with CV/RGB and sound inputs

**SPECIAL PROMOTION**  
**ONLY £199** INC VAT AND LEADS

(GBP 25 UK Mainland)  
Collection no problem

**SPECIAL  
PROMOTION**

Available from Direct Electronic Displays, Unit 7, 581A High Rd, London N17 Tel: 01-835 6647

## SHARDS proudly introduce for the Dragon 32

# "The Mystery of the Java Star"

THIS IS AN EDUCATIONAL ADVENTURE OF EPIC PROPORTIONS

Taking up over 100K of memory, including 80K of high resolution graphics, and loading in four parts, this adventure is designed to provide hours of family fun, filled with puzzles, challenges and interesting facts. Also, with three levels of difficulty and a score sheet at the end, this is a game you can play again and again, to try and beat your last score.

You have discovered an old map and a ship's log book, indicating the existence of magnificent treasures, including a mysterious ruby, the Java Star, aboard an 18th-century sailing ship, that sank in the Caribbean. You must mount an expedition, gathering all the necessary information, then search for the shipwreck and the hidden treasure. Many skills are needed to solve this mystery, making it the ideal adventure for friends or family to play together.

**ALL THIS  
FOR ONLY  
£7.95**

AVAILABLE NOW AT ALL GOOD STOCKISTS OR BY PHON-  
ING THROUGH YOUR ACCESS/BARCLAYCARD ORDER TO  
01-514 4871 OR BY SENDING A CHEQUE/PO FOR £7.95 TO  
SHARDS SOFTWARE, 188 ETON ROAD, ILFORD, ESSEX IG1  
2JQ



# OPEN FILE FOR DRAGON USERS

Send us your Dragon programs, beginning with a general description and then explaining how the program is constructed. Take care that the listings are all bug-free, enclosing a cassette and, if possible, a printout. We pay £3 for each bug-free program published, double for the program of the month. If you have any problems with the listings, please send your queries to the appropriate author. Dragon User, 12-13 Little Newport Street, London WC2E 8LS.

## Patterns

### Patterns

From *Let's go Dragon* from Aberystwyth  
TWO SHORT PROGRAM illustrates the range of possibilities that the combined

use of various PMODEs and PCOPY statements give us in terms of enlarging the image, etc. Some interesting things happen when you PCOPY a graphics page generated in colour in PMODEs, representing a quarter of the screen in that mode, to a single black and white page in PMODE filling the whole screen.

By randomising the whole process one

gets an almost endless variation of patterns.

Then randomise the accompanying sound as well and the effect becomes quite mesmerising.

The further addition of randomised CRL/CLL commands leads to an even more interesting effect, but we will leave you to experiment with that.

```
10 ' PATTERN2 c 1.4p Baynes, 10/83
20 ' ** A program to demonstrate some variations on PMODE and PCOPY
30 PELS RND(5)-1
40 PMODE RND(5)-1:SCREEN 1,1
50 FOR X=2 TO 250 STEP RND(10)
60 COLOR RND(4),RND(4)
70 LINE(0,X)-(X,0),PMODE
80 LINE(255,X)-(255-X,X),PMDT
90 NEXT
100 FOR X=2 TO 250 STEP RND(10)
110 LINE(0,X)-(X,0),PMDSET
120 LINE(255,X)-(255-X,X),PMDSET
130 NEXT
140 SOUND RND(255),2
150 FOR I=1 TO 4
160 PCOPY I TO RND(4)
170 NEXT
180 GOTO 40
```

## Spelling

From Bob Palmer in Harlow

LAST CHRISTMAS my neighbour came and asked my advice on whether he should buy a dedicated Speak & Spell machine for his son, or a home micro-computer with a spelling tutor type program. At that time I was not aware if there were any spelling programs available for micros but I did know that the communication of some of the Speak & Spell machines, and their range of vocabulary, left a lot to be desired.

Both of these factors I considered to be very important. After all, correct pronunciation is a prime requisite of good spelling, and the ability of the machine to progress with the student is essential for it to be worthwhile. At that time I decided to write a quick program to demonstrate the Dragon's capabilities.

I then did no more on the project until several weeks ago, when in my local library, I contacted a member asking if there were any books to help her 11-year-old son improve his spelling. I thought... it is a book on appropriate tool in this age of television, home videos and electronic machines? Surely a computer program that could teach spelling would be more appealing to a young person and therefore more effective.

I decided then to dust off my original program and write what I hope is an effective but enjoyable update. The program Spell has instructions "built-in". I suggest that you run the program once, straight into Spelling Tutor, then re-run and go into the "speech input mode". The password is SPGL1.

### Program notes

Lines	Page one of introduction.
30-80	Page two of introduction.
100-110	Password entry routine.
120-280	Spelling data.
300-340	Speech data.
350-380	Data read statements.

400-450	Page one of speech data input instructions.
460-510	Page two of speech data input instructions.
520-700	Speech data input routine (line 640 FOR D = 1 TO 1700 is for the time allowed to input a word (approx. 2.5 secs)).
720-740	Page one of spelling instructions.
750-800	Initialising Array 50 with score data.
820-980	Page two of spelling instructions (line 930 FOR D = 1 TO 1700 is the playback time for a word (the complement of line 640)).
1000-1020	Spelling check routine (this routine sets F1 to 1 if the words do not match).
1030-1080	Correct answer routine.
1070-1090	Incorrect answer routine.
1100-1180	Page three of spelling instructions (vowel identification routine).
1190-1200	Continuation of page three. ▶

# Deltas for Dragons



**Complete control at your fingertips.**

The smooth control of a Voltmace DELTA sprung return joystick is now available to Dragon owners. Called the DELTA 3D it is a cut down version of our DELTA 148 handset.

The same robust ball and socket jointed joystick but with the keypad blanked off to leave a choice of one of three fire buttons.

- Nylon encased - fixed shafted joystick with ball and socket joint
- Fast spring return to centre
- Graphite wipe line potentiometers

**DELTA 3D joystick ..... £18.00 each  
or £19.50 per pair**

## Voltmace Ltd

PARK DRIVE, BALDOCK, HERTS. SG1 1B  
Tel (0463) 814418

Custom welcome at the factory - Monday to Friday  
Made in England. Trade terms available.



# Voltmace delta 3d



## The best books for the Dragon 32



### The Working Dragon 32

A library of practical sub-routines and programs. *Rev. 1/1982 £2.95*

- These clearly & concisely provide more than just games - Practical Computing.
- Page 1982
- It's a good one! - Personal Computer News, May 26 1982



### The Dragon Trainer

Written as a combined manual and beginners course on the power of Dragon Basic. It is aimed at the beginner and assumes no previous experience of computing. *Rev. 1/1982 £2.95*

### Dragon 32 Games Master

Learn how to write your own top level games. *Rev. 1/1982 £2.95*

- If you can't write a full way decent game after this then it will be down to your own lack of imagination. I would recommend the Basic book as the best of this selection. - Which? Magazine - Sept 83

### Advanced Sounds & Graphics for the Dragon Computer

All the major aspects of the sound and graphics capabilities of this machine are covered in extensive detail. *Rev. 1/1982 £2.95*



**Plus Sunshine Software**



### Cracking

Quick thinking and dexterity are required to master this high speed chase game.

Look out for the Sunshine range in W.H. Smith's, Boots, John Menzies, other leading retail chains and through our national network of bookshops and specialist stores.

Dealer enquiries: 01-734 3454

### Please send me

- |  |  |
|--|--|
| <input type="checkbox"/> The Working Dragon 32 at £2.95 each | <input type="checkbox"/> Dragon 32 Games Master at £2.95 each    |
| <input type="checkbox"/> The Dragon Trainer at £2.95 each    | <input type="checkbox"/> Advanced Sound & Graphics at £2.95 each |
| <input type="checkbox"/> Cracking at £2.95 each              |  |

I enclose cheque/postal order for £..... made payable to Sunshine Books, 12/13 Little Newport St., London WC2R 2JD

Name .....

Address .....

Signature .....

We can normally deliver in 4-5 days.

1200-1260 Page four of spelling instructions.

1340-1400 Score selection and display.

1607-1680 Final page of spelling tutor. Note that it would be possible to include in the speech data input a phrase such as...

SPELL PRACTICE. AS IN YOU MUST PRACTICE EVERY DAY by increasing the value of C in lines 640 and 650.

```

0 DIM DEC(10),SCH(10)
20 CLS
30 " PAGE 1 OF INTRODUCTION"
40 PRINT@C240,"SPELLING TUTOR"
50 PRINT@C40,"BY BOB PALMER (C)"
60 PRINT@C90,"IN A FEW MOMENTS YOU WILL HEAR TONES. PLEASE ADJUST THE VOLUME OF
THE TELEVISION FOR COMFORT-ABLE LISTENING. PLEASE PRESS THE 5
SPACEBAR TO CONTINUE."
70 FOR D=1 TO 1000NEXT D
80 SOUND 89,4:GOSUB 100,4:GOSUB 70,4
90 IF INKEY$ <> CHR$(32) THEN GOTO 110
100 GOTOFOR D=1 TO 400NEXT D
110 PRINT@C10,"IF YOU NEED TO ENTER SPEECH DATA... ENTER YOUR 'PASSWORD'"
120 GOSUB 1000
130 T=INKEY$:GOTO 130:INKEY$
140 IF T=INKEY$ THEN GOTO 140
150 IF T=CHR$(32) THEN GOTO 160
160 T=INKEY$
170 GOTO 170
180 IF LEN(T) <> 1 THEN GOTO 180
190 IF T= T THEN GOTO 200
200 GOTO 210
210 IF EC = 3 THEN GOTO 220
220 PRINT@C27,"INCORRECT PASSWORD"
230 PRINT@C90,"PLEASE TRY AGAIN"
240 FOR D = 1 TO 1000NEXT D
250 PRINT@C90,""
260 PRINT@C27,"GOTO 130"
270 PRINT@C27,"INCORRECT PASSWORD"
280 PRINT@C300,"PASSWORD ENTRY ABANDONED"
290 FOR D = 1 TO 1000NEXT D
300 FL=2
310 " * OVERSPEAK ROUTINE *
320 CLS
330 DATA NEITHER,FORGET,LEADLINE,PROTEIN,DEICE
340 DATA SOVEREIGN,SURFECT,WEIR,FORDON,WEIRD
350 DL=10
360 FOR I=1 TO DL
370 READ B(I)
380 NEXT I
390 IF FL = 2 GOTO 720
400 PRINT@C5,"THE PROGRAM IS SET-UP TO ACCEPT TEN WORDS. THESE ARE STORED IN DA
TA STATEMENTS."
410 PRINT@C10,"INSTRUCTIONS FOR CHANGING THE TEXT OF WORDS TO BE SPELLED...
420 PRINT@C25,"1/ FIRST EDIT LINES 330 & 340 AND ENTER THE NEW TEXT.
430 PRINT@C27,"2/ OVER THE NEW PROGRAM, THEN CLOAD AND RUN.
440 PRINT@C304,"IF YOU HAVE COMPLETED 1 & 2 ABOVE PRESS SPACEBAR TO CONTINUE"
450 PRESS "BREAK KEY."
460 IF INKEY$ <> CHR$(32) THEN GOTO 450
460 CLS
470 PRINT@C7,"RECORDING SPEECH DATA"
480 PRINT@C7,"1/ REMOVE THE 'MIC' OR 'AUX' PLUG FROM THE CASSETTE
RECORDER
490 PRINT@C10,"2/ SET THE RECORDER CONTROLS TO 'RECORD'"
500 PRINT@C20,"3/ IF YOUR RECORDER DOES NOT HAVE A BUILT-IN MICROPHONE,
CONNECT MICROPHONE
510 PRINT@C17,"PRESS THE SPACEBAR WHEN YOU ARE READY TO RECORD"
520 IF INKEY$ <> CHR$(32) THEN GOTO 520
530 CLS
540 GOTO 1
550 PRINT@C5,"THE WORD TO
560 PRINT@C20,"THIS SHOULD BE PREFIXED WITH PRONUNCE IS... 'ADJIC'
570 FOR D = 1 TO 2000NEXT D THE WORD 'SPELL'
580 CLS
590 PRINT@C27,"PLEASE SPEAK AFTER THE TONES"
600 FOR D = 1 TO 6000NEXT D

```

Continued on page 55

```

610 SOUND 125,4
620 SOUND 89,6
630 MOTOR ON
640 FOR D = 1 TO 1700:NEXT D
650 MOTOR OFF
660 IF CS = DL THEN 680
670 CS = CS + 1:CLS:GOTO 550
680 CLS
690 PRINT#129,"NOW REWIND THE TAPE TO THE BEGINNING OF THE PROGRAM AND C
LOAD. THEN WILL POSITION THE SPEECH PART OF THE TAPE CORRECTLY
700 PRINT#129,"PLEASE REMEMBER TO REPLACE YOUR MIC/VOL. PLUS.
710 GOTO 1490
720 PRINT#67,"WELCOME TO SPELLING TUTOR"
730 PRINT#126,"IN A FEW MOMENTS YOU WILL HEAR A SERIES OF WORDS.
740 PRINT#124,"CAREFULLY NOTE THE PRONUNCIATION OF EACH WORD, THEN FOLLOW THE D
DISPLAYED INSTRUCTIONS.
750 S$="(1)="" YOU NEED PRACTICE"
760 S$="(2)="" NOT GOOD, BUT DO NOT WORRY YOU WILL SOON IMPROVE WITH PRACTICE"
770 S$="(3)="" GOOD, KEEP PRACTICING AND YOU WILL SOON ACHIEVE AN EXCELLENT SCO
RE"
780 S$="(4)="" VERY GOOD! NOT FAR FROM AN EXCELLENT SCORE"
790 S$="(5)="" WELL DONE! AN EXCELLENT SCORE"
800 S$="(6)="" WELL DONE! A PERFECT SCORE, YOU ARE NOW READY TO GO ON TO THE NE
X PROGRAM"
810 PRINT#416,"PLEASE PRESS THE SPACEBAR TO CONTINUE
820 S$="" ** IF YOU MAKE AN ERROR, TO ** ** RESTART LINE, PRESS KEY:"
830 IF INKEY$<<CHR$(32) THEN 830
840 CLS
850 CP=CP+1
860 IF CP<DL THEN GOTO 880
870 GOTO 1540
880 PRINT#67,"LISTEN CAREFULLY"
890 FOR D = 1 TO 200:NEXT D
900 AUDIO ON
910 MOTOR ON
920 FOR D = 1 TO 1700:NEXT D
930 MOTOR OFF
940 AUDIO OFF
950 PRINT#69,"NEW TYPE IN THE WORD"
960 PRINT#170,"AS SOON AS YOU HAVE TYPED IN THE CORRECT NUMBER OF CHARACTERS Y
OUR WORD WILL BE CHECKED. IF TWO FEW CHARACTERS ARE USED THE WORD WILL REMAIN
ON THE SCREEN.
970 PRINT#122,"THIS ALONE WILL INDICATE THAT THE SPELLING IS INCORRECT.
980 PRINT#168,SP#(CHR$(127))=""
990 L=LEN(D$CP):
1000 SOUND 1440
1010 IF FL=1 THEN 1070
1020 CLS:SC=SC+1:IF CP=DL THEN 1540
1030 SOUND 125,4:SOUND 100,6
1040 PRINT#104,"CORRECT, PLEASE CONTINUE"
1050 FOR D=1 TO 1000:NEXT D
1060 CLS:CT=D$SC=""GOTO 840
1070 CLS
1080 PRINT#68,"YOU HAVE MADE AN ERROR.
1090 FOR D = 1 TO 500: NEXT D:CLS
1100 PRINT#123,"TO HELP YOU, HERE ARE THE POSITIONS OF THE VOWELS..."
1110 PRINT#416,SP#(CHR$(127))=""
1120 D$="(1)=""A"(2)=""E"(3)=""I"(4)=""O"(5)=""U"
1130 FOR I=1 TO L
1140 FOR C=1 TO 5
1150 IF MID$(D$CP,I,C)=C(4) THEN PRINT#104+I,C:GOTO 1300:FOR D=1 TO 20
0:NEXT D:GOTO 1170
1160 NEXT C:PRINT#104+I,"":SOUND 200,3:FOR D=1 TO 200:NEXT D
1170 NEXT I
1180 FOR D=1 TO 200:NEXT D
1190 PRINT#177,"NOW PLEASE TRY AGAIN"
1200 SOUND 1440
1210 IF FL=1 THEN 1230
1220 GOTO 1000
1230 CLS:PRINT#122,"YOU HAVE MADE ANOTHER ERROR BUT DO NOT WORRY, HERE IS THE
CORRECT SPELLING..."

```

Continued on page 58





```

1240 FOR B=1 TO 7
1250 SOUND 120,1
1260 PRINTB;"B",B;" "
1270 FOR D = 1 TO 200:NEXT D
1280 NEXT B
1290 FOR HC = 1 TO L
1300 FOR D = 1 TO 400:NEXT D
1310 SOUND 200, 3
1320 PRINTB;D;"LEFT" (D*(CP),HC)
1330 NEXT HC
1340 PRINTB;D;"PLEASE COPY THE WORD TO"
1350 PRINTB;D;"EPRHCHDR" (D*27);B;" "
1360 GOSUB 1440
1370 IF PL=1 THEN 1360
1380 GOTO 940
1390 PRINTB;B;"YOU MADE AN ERROR, PLEASE"
1400 FOR K=1 TO 2000:NEXT K
1410 CLS
1420 GOTO 950
1430 GOTO 370
1440 PRINTB;B;"ACT" (D*(B)*PL);B;"X" (D*(B)*B)
1450 B=X:INKEYB IF B="" THEN 1450
1460 IF B<>CHR(32) THEN 1460
1470 GOTO 1440
1480 CT=CT+1
1490 PRINTB;B+CT;B+1
1500 B=B+B+1
1510 IF CT>L THEN 1450
1520 IF B=CHR(32) THEN PL=1:RETURN
1530 RETURN
1540 CLS:SOUND 120,4:SOUND 80,1
1550 ON SC+1 GOTO 1560,1570,1570,1570,1570,1580,1590,1590,1600,1610
1560 SC=SC+1:GOTO 1620
1570 SC=SC+1:GOTO 1620
1580 SC=SC+1:GOTO 1620
1590 SC=SC+1:GOTO 1620
1600 SC=SC+1:GOTO 1620
1610 SC=SC+1:GOTO 1620
1620 PRINTB;D;B
1630 PRINTB;B;"YOU HAVE CORRECTLY SPELLED "B;" OUT OF "L;" WORDS"
1640 FOR D=1 TO 500:NEXT D
1650 SOUND 120,4:SOUND 80,1
1660 PRINTB;B;"YOU HAVE COMPLETED"
1670 PRINTB;B;"PLEASE PRESS THE STOP CONTROL"
1680 PRINTB;B;"IF YOUR SCORE IS LESS THAN 100."
1690 PRINTB;B;"RECORD & RELOAD AND TRY AGAIN"
1700 B=1:GOTO 1440
1710 GOTO 1440

```

## Roadride

From Andrew Thompson in Heathfield

ROADRIDE is a game where you have to drive a car through a narrow stretch of road. The further you go, the smaller the road gets.

The left and right arrow keys are used for movement. Sound is optional. Instru-

ctions are given in the program. The machine code is a sound routine; it is used to get sound constantly through the program. If the speed-up pulse (POKE 65535, 0) doesn't work on your computer, delete line 220.

```

100 FORP=20000TO200000
20 READR
30 POKEP;VAL("M"+R)
40 NEXT
50 POKE411,BH45
60 POKE412,BH28
70 POKE413,BH20
80 DATA0,84,83,80,84,83,35
90 CLS
100 PRINTB;B;" "
110 L=INKEY;"DO YOU WANT INSTRUCTIONS?"
120 IFLEFT=CHR(37) THEN 130
130 IFLEFT=CHR(39) THEN 140
140 CLS:RND(32)
150 SOUNDRND(255),2:GOTO200
160 CLEAR400
170 CLS
180 PRINTB;B;"DO YOU WANT SOUND?"
190 B=INKEYB

```

Continued on page 57

1984

## The complete speech synthesis system

### SPEECH SYNTHESIS MODULE for the Dragon 32 computer

- Fully tested module plugs into cartridge port
- Unlimited vocabulary, using allophone-type, dedicated speech chip
- Approximately 250 words predefined, accessed by entering word required
- Complete control using five new BASIC commands
- Speech can easily be incorporated into existing BASIC programs
- Up to 40 words spoken from one command; speech can occur simultaneously with graphics
- £37.95 inclusive

Also available: **SOUND EXTENSION MODULE** for use with the Dragon computer — provides facility to play chords and harmonies over five octaves — easy to use via BASIC — built-in sound effects — music and graphics can occur simultaneously — two I/O ports — user manual — ONLY £34.95 inclusive

ACCESS/Checker PD to:

**J.C.B. (MICROSYSTEMS)**

29 Southbourne Road, Bournemouth, BH6 5AE  
Tel: (0202) 423673

Write or phone for further details

## NEW — FOR ALL DRAGON USERS

### Programming the Dragon 32

Peter Lafferty

This new book guides Dragon 32 users from the humblest level of programming in BASIC to the point where they can write programs that make use of the Dragon's most sophisticated features.

The book covers simple graphics, high-resolution graphics, colour, animation, sounds, music, physics and the printer. Included are listings of many programs not previously available for the Dragon 32.

Softcover 256 pages 0 468 01443 1 £5.95

Available from your nearest bookseller.



**Newnes Technical Books**  
Boreham Green, Stevenage, Essex SS15 5PB



## of the hill!

The **RAINBOW** is the biggest and best magazine available for the TRS-80 Color, TD-100, MC-10 and Dragon-32 Computers.

And no wonder! It's over 300 pages thick each month... pages brimming with programs, product reviews, tutorials, columns, facts and tips about your computer. Yes, it is considered "the" Color Computer magazine to buy.

Don't delay. For only \$28 you can get the **RAINBOW** every month of the year. Then your DoCo will be King of the Hill too!

U.S. Subscription rates  
U.S. \$45 outside rate  
U.S. \$100 air rate

1-800-368-6868

the Rainbow (001220-1140)  
PO Box 200

request my 400p  
1000-page manual for a personal review of the Rainbow/DoCo

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

Payment Enclosed \_\_\_\_\_

Charge \_\_\_\_\_

My Account \_\_\_\_\_

Signature \_\_\_\_\_

State \_\_\_\_\_

Zip \_\_\_\_\_

American Express \_\_\_\_\_

MasterCard \_\_\_\_\_

Card # \_\_\_\_\_



McGraw-Hill

McGraw-Hill

McGraw-Hill

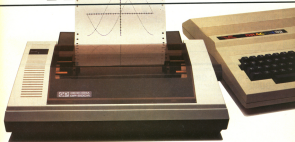
McGraw-Hill

Subscription to the **RAINBOW** is \$28 a year (12 issues) plus \$5.00 for shipping and handling. Payment in U.S. dollars only. Payment in U.S. dollars only. Payment in U.S. dollars only. Payment in U.S. dollars only.





# AT £249.00, THE TAIL'S NOT WAGGING THE DRAGON.



*How could you get a lot more for a printer as interface with your Dragon.*

*Just it seems easy to turn a screen with an ink-on everything or paper bag running into there or four hundred pounds.*

*Especially when the revolutionary Seikosha GP3001 does so much for so little.*

*For example, it's got full graphics capability, with a single command enabling a volume of graphic data to be repeated as many times as you wish.*

*Printing speed is 30 characters a second in our 50 column dot matrix format on standard width paper (up to*

*able up to 10 inches).*

*And under its compact casing, the Seikosha packs a wealth of sophisticated features like automatic printing (no data lost due to overflow), intermixing of graphics, character and double-width character modes on a single line and printing of a copy as well as the original.*

*It all adds up to a quality, reliable ink-on that breathes new fire into your Dragon's performance: accounts, cataloguing, lists, charts, diagrams and program debugging are now all available in print.*

*See the Seikosha GP3001 in action - phone for details and the address of your nearest dealer.*

# SEIKOSHA DRG

DRG Business Systems, Designware Division, 10-14 Lyne Crescent, Hitherstone Rd, Boston Spa, Leeds, Area BS24 9PX.  
Telephone: 0534 479314. Telex: 444754.

**£25**

inclusive

# A QUALITY LIGHTPEN

**For the DRAGON 32\***

Optimum program performance is achieved by use of the superb features only available from the Datapen Lightpen.

Drawing:  
POLYLINE and POLYAREA

Freehand,  
hollow grid,  
line, circle,  
point, cross.

Also:  
X, Y position,  
largest menu,  
text menu and  
library shapes.

## SUPERIOR PROGRAMS

- Tape storage of your work
  - Good documentation
  - User routines provided on tape and on printout
  - Handbook and three programs on tape
- \*Also available for BBC B, Vtg30 and Commodore, please state your micro before ordering.

Sold cheaper on PPI for £20.00

Dept DUS

**Datapen Microtechnology Limited**  
Kingsclere Road, Overton  
Hants, RG25 3JB

Or send SAE for details. Not available from good computer shops.



## SUPERIOR PERFORMANCE

- Insensitive to ambient lighting
- Responds to different colours
- Program accessible LED lamp readout
- Switch for program control

## DELTAFT PRODUCE PRESENTS THE HI-RES COLOUR GRAPHICS DUMP

FOR THE DRAGON 32  
AND THE TANDY CO-CO

You can now copy all high resolution graphics screens available from Basic, onto paper with a:  
Tandy CDP 116 (Printer plotter)  
MCP-48 (4 colour printer plotter)  
CIC printer  
Sharp Printer plotter  
and the Colour Graphics Dump program.

This program dumps all the graphic screen available from basic, both monochrome and colour. Extensive features include:

- Choice of any two or four colours from a palette of 16
- HALF HEIGHT and HALF WIDTH modes if the graphics mode allows
- Special SLOW MODE for greater accuracy and greater depth of colour
- EXTRA HEIGHT mode for dumping more than a full screen and others

Available from DELTAFT at  
the special low price of only £4.95 each

Please make cheques and POs out to Deltaft and send reply to: DELTAFT, 40 Windsor Road, Doncaster, DN2 5BT.  
Tel: 0300-610116

Trade Enquiries Welcome

Dragon 32	£4.95
Tandy Co-Co	£4.95
Tandy CDP 116	
MCP-48	

Name

Address

Postcode

## THE FILING SYSTEM

A PROFESSIONAL PROGRAMME WITH A  
BUILT-IN TEACHER



**£20.00**

A second-keeping system of business standard which uses the Dragon's unique trace to teach you how to use it. Presented in 44 ring binder and accompanied by a comprehensive user manual and full program listing.

### THE FILING SYSTEM GIVES YOU:

- Multiple search on any of 20 fields
- Four different types of search
- Up to 200 records in memory
- A search length of 22 fields
- Mathematical functions within and through records
- Phone number or volume listing with automatic sort
- Plus other features normally found in disk-based packages costing £200+

A very professional product... Well worth the money! (PCW 1/8/83)  
Whether you're a computer beginner or even you have experience, all this to CDP! But don't send us your money till we've sent you a full information sheet.

Coming shortly - Dragon disk version and Shetland version

### Progressive Software

Marsh Street, Walsall, West Midlands

Telephone: Walsall 680993

• DELTAFT ENCLOSURE W/1/0001 •

```

280 IF A#="" THEN 120
290 IF A#="N" THEN FORK20000,57 ELSE IF A#="T"
THEN FORK20000,600 ELSE 120
320 FORK55000,0
330 CLS
340 FORP=0TO0
350 A4(P)=STRING$(17+P,200)+STRING$(10-P
,100)
360 NEXT
370 S=0
380 L=0
390 D=1
400 I=0
410 L2=0
420 T=0
430 FORK140,1
440 IF PEEK(343)+223 THEN X=X-1:IF X<0 THEN X
=0
450 IF PEEK(344)+223 THEN X=X+1:IF X>31 THEN X
=31
460 Y=Y+D
470 S=S+5
480 IF T<12-1 THEN T=Y+1:D=-D
490 IF T>12 THEN T=Y+1:D=-D
500 PRINT$400+Y,A4(1);
510 IF PEEK(1024+X)+233 THEN X=X
520 FORK1024+X,125
530 IF X=15 THEN T=T+D
540 IF T>102 THEN X=X+1:FORK140,145+1:T=T+1
550 IF T=102 THEN
560 T=T+1
570 FORK1024+475+RND(32),335
580 GOTO340
590 CLS
600 PRINT"YOU CRASHED"
610 PRINT"YOUR SCORE IS"
620 L=L+1
630 IF L=0 THEN 700
640 PRINT"YOUR NUMBER OF LIVES ARE"
650 FORK410,57
660 FORP=1TO5000
670 NEXT
680 FORK410,600
690 CLS
700 GOTO340
710 END
720 FORP=1TO10
730 PRINT$RND(100)+32,120
740 IF PEEK(1024+X)+233 THEN X=X-1:T=T-0:GOTO4
00
750 FORK1024+X,125
760 IF PEEK(343)+223 THEN X=X-1:IF X<0 THEN X
=0
770 IF PEEK(344)+223 THEN X=X+1:IF X>31 THEN X
=31
780 IF PEEK(20000)+57 THEN FORK140,PA1BELLS
EPORDL,=1TO30:NEXT
790 NEXT
800 PRINT
810 PRINT"YOU HAVE FINISHED THAT ROAD"
820 PRINT"YOUR SCORE IS"
830 IF L THEN PRINT"AND YOU HAD"
840 L2=L2+1:PRINT"AND YOU HAD A LIFE LEFT"
850 FORK410,57
860 FORP=1TO4000
870 NEXT
880 FORK410,600
890 CLS
900 PRINT"OUT OF LIVES"
910 PRINT$RND(100)+32,120
920 FORK410,57
930 FORP=1TO5000
940 NEXT
950 FORK410,600
960 CLS
970 LINE INPUT"DO YOU WANT ANOTHER GAME?"
980
990 IF LEFT$(A#,10)="" THEN 100
1000 IF LEFT$(A#,10)="" THEN FORK55000,0:FORK
1410,57:END
1010 GOTO340
1020 CLS
1030 PRINT$400,"ROADSIDE"
1040 PRINT$400,"BT"
1050 PRINT$400,"ARCH"
1060 PRINT$400,"THOMPSON"
1070 FORP=1TO0
1080 PRINT
1090 SOUND1,1
1100 NEXT
1110 FORK410,57
1120 FORP=1TO500
1130 NEXT
1140 FORK410,600
1150 FORP=1TO0
1160 PRINT
1170 SOUND1,1
1180 NEXT
1190 PRINT"ROADSIDE IS A GAME WHERE YOU"
1200 PRINT"HAVE TO DRIVE A CAR TO THE EN
D"
1210 PRINT"OF THE ROAD. YOU USE THE LEFT
"
1220 PRINT"AND RIGHT ARROW KEYS TO CONTE
OL"
1230 PRINT"YOUR CAR."
1240 PRINT"AS YOU GO ON THE ROAD GETS"
1250 PRINT"SMALLER."
1260 PRINT$400,"press the spacebar to st
art"
1270 FORK1500,30
1280 FORK1513,30
1290 FORK1523,30
1300 FORK1505,30
1310 IF PEEK(345)+223 THEN
1320 GOTO340

```

**SLIK** Software present a Great New Graphic Adventure Game for the DRAGON 32

## ★ SUNKEN CITY ★

A complete, role-playing adventure, with full high-res graphics and colour.

Travel across five continents in search of the fabulous treasure of the Sunken City.

Visit the pyramids and the lost tombs of the Incas, encountering dozens of deadly enemies . . .

Avoid pirates and other hazards on deep sea voyages to mystic lands. Beware of cannibals and head-hunters in Africa's savage jungles . . .

Free the dying wizard and discover his vital secret in your final search for the Sunken City.

This absorbing, addictive game uses the full resources of the Dragon 32 and is a challenge to your skill and ingenuity which will keep you glued to your screen for many, many hours!

For fast delivery send name, full address and cheque or PO for £7.95 NOW!

To: Slik Software, 19 Sencroft Street,  
London SE11 5UG.

## JOYSTICKS FOR THE DRAGON 32



ONLY  
**£18.95 a pair**

Top quality, self-centring, easy to handle joysticks for the enthusiastic games player

**£1.00 OFF WHEN YOU RETURN THIS ADVERTISEMENT WITH YOUR ORDER**

Please add 75p p.p.

To order, send  
Cheque/PO to:

**CASCOM**

87 ELSTOW ROAD, BEDFORD MK42 9NT

## M & J SOFTWARE

### "DRAGON ADVANCED PROGRAMMER'S PACKAGE"

We provide the most comprehensive PDP11th documentation on the market - and computerised specifications with those of other CPM's packages. Features:

1. The language itself which can store, delete, assemble from, auto edit, program, translate, maintain the largest & most powerful facilities.
2. A complete text editor which enables adaptability to processing programmed data as a standard word processor.
3. A list.
4. The PDP11th Installation Manual which contains the PDP11th source code, assembly etc.
5. A manual containing list of example programs including the source code for the PDP11th microcomputer.

But there's lot more!

To complete the package we provide a copy of the "Dragon Companion" - this magnificent publication contains all the 1988 documentation, an extensive program library, basic source codes to various microcomputer models, how to write programs and test them. £98.00 £75.00

or your nearest dealer, Dragon and PDP stores to

**M & J SOFTWARE**

24 George Cross, Scholart Green  
Stoke-on-Trent ST7 3LJ. Tel: (0582) 617676

## DON'T JUST PLAY GAMES!

## EDUCATIONAL SOFTWARE

Physics (2 level) (OS Revision)  
Biology (2 level) (OS Revision)  
Computer Studies (2 level) (OS)  
Spelling (computer) (8-10 years)  
Mathematics (Practice 8-11 years)  
Reasoning (11-14 years)  
Science (Practice 10-14 years)  
English (Practice 12-14 years)

Maths (OS) (Revision)  
Sports (OS) (8-10 years)  
Times (Practice) (11 years)  
Knowledge (OS) (8-10 years)  
English (Practice) (11 years)  
Arithmetic (Practice) (11 years)  
Sports (Revision) (12-14 years)

Unbeatable value at £4.95 each. Post free.

### 'O' Level-CSE Computer Studies

A set of four cassette, just packed with up-to-date knowledge covering the 'O' level-CSE syllabus. Plus material with revision questions.

Subject areas include:

Data entry, Data Storage, Computer Arithmetic, Computer Logic, Programming Information, Security and Computers, Computer Structure, Backing Storage

and much, much more.

Also suitable as a general introduction to the computing world (Mums and Dad's guide note).

**FANTASTIC VALUE AT £14.95 per set**

### PRO-FILE CS-86

The cassette based filing system

Hundreds of uses in the home. Easy-to-understand 36 page manual. Design your own file system.

"Your Computer is actually useful" (PCW July 86)

"Priced down, everything is done, and done it well" (Which Home November 1985)

"One of the best manuals of its type I have seen, ideal for the novice" (PCW December 85)

Cassettes and PD to:

### MICRO-DE-BUG CONSULTANCY

Dept. U, 80 St John's Road, Selly Park  
Birmingham B29 7ER. Tel: 021-472 7640

## DRAGON 32 MICRO-BYTE 8 MB+40-80000 10000 C.C. FOR ELECTRON 747 FLIGHT SIMULATOR

Quality digital instrumentation and a state of the art simulation which includes atmospheric, fuel, oil, engine, flap and landing facilities. The programme has high resolution graphics in the 32 to produce the most realistic flight characteristics yet seen on a home computer. There are 17 scenarios and 15-40 minutes per scenario. You can now compare flight, altitude, procedures, fuel, rate, engine, landing gear, reverse thrust, etc. You can see the runway in perspective, view position and monitor all items in real time with off to on-board landing approach. A real simulation, not just another game. After Christmas (April 15th).

Complete flight logs and report sheets.

**DACC Ltd (Dept. DU)**

33 Hensley Road, Stiles

London Warrington W9 1JG

(Delivered within 48 hours)



ACTUAL SCREEN PHOTOGRAPH

1-100 £27.50 plus postage

10000 plus postage

10000 plus postage

10000 plus postage

10000 plus postage

10000 plus postage

10000 plus postage

10000 plus postage



## MONSTER SOFTWARE CLUB

10000 plus postage

- Software for hire from 11 manufacturers
- Over 90 titles to choose from, and growing
- TWO YEARS membership for only £8.00
- Same-day service

Software at 10% discount. Send SAE for details and list of titles available to:

### MICROBYTE COMPUTER SHOP

12a Lower Warrington  
Wakefield WF1 1SA



# Dataseave

From *A Beginner in Microsoft* by  
THE VERSION OF Basic supplied with the  
Dragon 32 has one very useful command for  
the purposes of information retrieval —  
the **INSTR** command. For anyone who is  
unfamiliar with its function, it allows you to  
search through any string of characters to  
find a "target" string (eg a word). This  
means that you can type in any characters  
you like, and then ask the computer to  
search for any character or group of

characters you may wish to find.

As I wanted a simple (and cheap) bit of  
software to keep a record of my photo-  
graphic slides, I wrote the short program  
Dataseave which utilizes this command to  
allow me to find any slide on any subject  
simply by entering an appropriate word for  
the computer to find in my data records.

Input of data is limited to two fields, but I  
find this adequate for most purposes. The  
program will allow you to save a data file  
on tape and recall it for alteration and  
retrieval. It could, of course, be used for  
many purposes: names and telephone  
numbers, any simple cataloguing, a dictionary,  
etc. You are also given the facility

to print out individual records if you wish.

The program has, of course, only limited  
facilities, but is a reasonable basis for  
expansion.

Things to note:

- 1 If you want to create a data file when  
you already have one in memory it is  
necessary to end the program run and  
start again.
- 2 When you save data to tape the tape  
recorder is switched on so that you can  
move to a clear section of your tape. Do  
this before you enter a filename and press  
ENTER.
- 3 If you list the whole data file, the up and  
down arrow keys have auto-repeat.

```

1 REMXXXXXXXXXXXXXXXXXXXX
2 REMAAA.D.BODEN 1982xx
10 FOPEN1
20 CLEAR 20000
30 CLS
40 C=""
50 DIM A$(200)
60 DIM B$(200)
70 GOTO 1120
80 CLS:PRINT:PRINT"Data store and search"
90 PRINT:PRINT:PRINT"TYPE IN RECORD THEN
  PRESS enter"
100 PRINT:PRINT"(UP TO 200 RECORDS)"
110 PRINT:PRINT:PRINT"PRESS ENTER TWICE
  TO END"
120 PRINT:PRINT:PRINT:PRINT:PRINT"press
  a key to begin"
130 IF INKEY$="" THEN 130
140 CLS
150 PRINT:PRINT"
160 PRINTF1;"---3"
170 LINE INPUT A$(C)
180 PRINTF2;"---3"
190 LINE INPUT B$(C)
200 IF A$(C)="" AND B$(C)="" THEN RETURN
210 C=C+1
220 GOTO 150
230 CLS
240 PRINT:PRINT:PRINT:PRINT"ENTER STRING FOR S
  EARCH"
250 LINE INPUT S$
260 CLS
270 FOR A=1 TO C-1
280 J=INSTR(1, A$(A), S$)
290 J=INSTR(1, B$(A), S$)
300 IF J=0 AND J=0 THEN 400
310 PRINTA1;" " 320 PRINTF3#
330 PRINTB4(A) 340 PRINTF2#
350 PRINTB4(C)
360 PRINT:PRINT:PRINT:PRINT:PRINT"press a key
  --- RIGHT ARROW TO END", "F TO PRINT"
370 G$=INKEY$:IF G$="" THEN 370
380 CLS:IF G$=F THEN RETURN
390 IF G$="F" THEN GOSUB 1100:GOTO 310
400 NEXT
410 RETURN
420 CLS
430 PRINT"YOU CAN ENTER TWO FIELDS OF
  INFORMATION"
440 PRINT:INPUT "TITLE OF FIELD ONE ";F1#
450 PRINT:INPUT"TITLE OF FIELD TWO ";F2#
460 GOSUB 50
470 RETURN
480 CLS:INPUT"ENTER FILENAME";F3$
490 OPEN ":",A-1,F3$
500 C=1
510 INPUT "F1";F1$,F2$
520 IF EOF(-1) THEN 560
530 INPUT A-1,A$(C),B$(C)
540 C=C+1 550 GOTO 520
560 CLOSE:A=1:RETURN
570 CLS
580 NOTOR ON
590 INPUT "FILENAME";F3$
600 OPEN ":",A-1,F3$
610 PRINTA-1,F1$,F2$
620 FOR Z=1 TO C
630 PRINTA-1,A$(Z),B$(Z)
640 NEXT Z
650 CLOSE:A=1:RETURN
660 CLS:INPUT"TYPE NUMBER OF RECORD YOU
  WISH TO CHANGE--";X
670 PRINT:PRINT"PRESENT ENTRY FOR RECORD
  ";X
680 PRINTF1# 690 PRINTB$(X)
700 PRINTF2#
710 PRINTB$(X)
720 PRINT:PRINT:PRINT:PRINT"ENTER NEW DATA"
730 PRINT:PRINTF1#
740 LINE INPUT A$(X)
750 PRINTF2#;"---3"
760 LINE INPUT B$(X) 770 RETURN
780 CLS:END
790 CLS
800 PRINT"DO YOU WANT TO --"
810 PRINT:PRINT"1. SEARCH FILE"
820 PRINT"2. LIST ALL RECORDS"
830 PRINT:PRINT:PRINT"enter number"
840 G$=INKEY$:IF G$="" THEN 840

```

Continued on page 61

RED ROM DATA  
75 LAMBERT ROAD, CANNIBY DRESSING

**Abstract** *Pharmaceutical companies have been accused of manipulating the drug approval process to delay the entry of generic drugs into the market. This paper examines the impact of pharmaceutical company actions on the timing of generic drug entry. It finds that pharmaceutical companies can delay generic entry by a significant amount of time, and that this delay is associated with higher prices for the brand-name drug. The paper also finds that the delay is not always in the best interests of consumers, as it can lead to higher prices and reduced quality of care.*



(10/10/01)  
 (10/10/01)  
 10/10/01 10/10/01  
 Clear Price: 10.00  
 10/10/01 10/10/01  
 10/10/01 10/10/01  
 Clear Price: 10.00  
 10/10/01 10/10/01  
 10/10/01 10/10/01  
 Clear Price: 10.00

CALL 800 546 6363 FOR OUR CATALOGUE

TUDOR WILLIAMS

THE UNIVERSITY OF CHICAGO

© 2000 Blackwell Science Ltd *Journal of Internal Medicine* 247: 395–402

Freezer ships 24 days delivery. Minimum 12 months guarantee.

© 2004 Blackwell Publishing Ltd *Journal of Internal Medicine* 255: 103–110

\*CTI CP80 del nostro primato ..... 0599 00

1. *Journal of Management Studies*, 1996, 33, 1, 1-14.

**Figure 1**

**CONTESSA,**  
Single Lane  
Low-Volume Road  
Boulder  
1999-2000

```

000 Q=VAL(Q$)
001 IF Q<1 OR Q>2 THEN 700
002 ON Q GOSUB 200,300
003 RETURN
004 CLS:PRINT:PRINT:PRINT
005 A=1
006 IF A=1 THEN A=1
007 IF A<C-1 THEN A=C-1
008 PRINT A;" "
009 PRINTF$="
010 PRINTA$C$
011 PRINTF$="
012 PRINTB$C$
013 PRINTB$C$
014 PRINTC$C$
015 PRINTA=2:PRINTA=2
016 RETURN
017 CLS:PRINT"===== Filing system"
018 PRINT:PRINT"DO YOU WANT TO ~"
019 PRINT:PRINT"1. CREATE A FILE"
020 PRINT"2. LOAD DATA FROM TAPE"
021 PRINT"3. SAVE DATA TO TAPE"
022 PRINT"4. SEARCH FILE"
023 PRINT"5. CHANGE FILE"
024 PRINT"6. ENTER RECORDS"
025 PRINT"7. END"
026 PRINT:PRINT"enter number of choice"
027 Q=INKEY$:IF Q="" THEN 120
028 Q=VAL(Q$)
029 ON Q GOSUB 400,400,500,700,600,60,7
030
031 GOTO 100

```

## Breakthrough

Robert C. Stebbins, in *American Museum of Natural History*

THIS IS A short game of brevity. The cat will be put on the left-hand side of the screen. Your job is to knock as many bricks out as you can. Along the top there is a record of how many times you hit the ball. How many lives you've lost and how

You get 15 points for every brick you knock out. To move the ball use the up and down arrow keys. You have five balls to clear the wall. But don't play the ball off your ball and into the back wall!

[illegible]

## OPERATION GREMLIN . . .

A very different game that combines the intrigue of adventure with the real time, machine code speed of arcade action. The player must control not one, but EIGHT different troopers, each with their own character status, in the search for the weapons that will destroy THE GREMLINS.

## DRAGON TREK

Dragon Trek is a new implementation of a classic game, taking full advantage of the Dragons hi-res graphics and sound capabilities. Your strategy's impressive movement is comprised of high energy Photon Torpedoes and Phasers. Both long and short range scanners (in full graphics) enable you to track the Klingons and your enhanced computer will give you extra tactical facilities. As commander you will have to use strategy and cunning to defeat the enemy.

## THE RING OF DARKNESS

BRITAIN'S No. 1 ADVENTURE GAME FOR THE DRAGON 32 IS NOW AVAILABLE FOR THE AMI, SPECTRUM AND ORIC

THE RING OF DARKNESS is a complete role playing adventure in hi-res graphics, featuring a detailed land filled with rivers, 3D dungeons, forests and seas, and populated by kings, princesses, evil rangers and other strange creatures. All versions are identical with respect to the adventure. The Oric version is recorded in fast mode only. Many hours of mystery and suspense await you in your quest to find The Ring Of Darkness.

ORDER WITH CONFIDENCE:  
All titles in stock are dispatched by return of post.  
SEND SAE FOR OUR FREE CATALOGUE.

Selected titles are also available from good software outlets and from Books.



Complete this order form and post it to: WINTERSOFT, Dept. (50) - 30 Uplands Park Rd., Enfield, Middlesex, EN2 7PT, (enquiries to)

The Ring Of Darkness	£1.95
Dragon Trek	£6.95
Operation Gremlin	£6.95
Amiga's Dragon Trek	£6.95
Amiga's Gremlin	£6.95
ORIC 32 add	
The Ring Of Darkness	£1.95
Operation Gremlin	£6.95
SPECTRUM add	
The Ring Of Darkness	£1.95

I enclose my cheque/PO for £.....

NAME.....

ADDRESS.....

All prices include p.p.h. VAT and the WINTERSOFT guarantee of quality and reliability.

**WINTERSOFT**  
Computer Software

WINTERSOFT, 30, Uplands Park Road,  
Enfield, Middlesex EN2 7PT.

DEALER ENQUIRIES WELCOME 01-347 6770

# "ADVENTURES INTO IMAGINATION"

AVAILABLE FROM W.H. SMITH, JOHN MENZIES, BOOTS  
AND ALL LEADING COMPUTER STORES

Spectrum 48K  
Dragon 32

## TRANSYLVANIAN TOWER

A spectacular 3-D maze  
adventure for the  
48K Spectrum and Dragon 32

RICHARD SHEPHERD  
SOFTWARE

A spine-chilling adventure ... enter via the dungeons ... navigate your way through 500 3-D rooms ... survive the swooping vampire bats ... reach the terrifying top ... confront and kill Count Kreeple, riding the world of this Transylvanian Terror.

Can you survive the Top of the Tower? £6.50.

# RICHARD SHEPHERD SOFTWARE

NEW DEALERS WELCOME — RING JOHN SALTHOUSE ON 06286 63531

All programs are sold subject to their publisher's terms and may be used for educational or other limited rental or otherwise purposes without the express permission of the publisher.



## Asking in confidence

AS I use my Dragon to run "business type" programs for a voluntary organisation, and as some of the information contained in these programs is of a confidential nature, to access the program the user is asked to input a "code" number.

The programs themselves work fine. The problem is, even if the user does not know the access code, by simply typing LIST and viewing the program, the number is displayed for all to see.

Therefore, is it possible to disable the LIST command, preferably from within the program? Or is there an alternative way to prevent this "way round" the code?

Also, initially I would like to keep a hard copy of the programs.

C Bond  
Accington,  
Luton

IT IS possible to disable any of the Dragon's commands, including LIST (and LIST). The program listed on this page will do this for you. I added to the beginning of your own program. Of course, most ROM even you won't be able to LIST the program, so make sure that it is totally fool-proof.

The principle used is quite simple: the program alters the LIST and LIST commands to act like ROM statements by moving the command pointer down into ROM and altering the relevant addresses. In the same way, you would disable the CORVE command to prevent anyone pinning your program.

## Cartridge pinout

I HAVE just read in Dragon User about the booklet "Information for Machine Code Users". I would appreciate some information about this booklet.

If possible, I would also like information on the pinout of the Dragon cartridge port, as I want to drive my Epsom programmer, and also to communicate with my old RIM 11 computer, which has now been relegated to controlling the central heating.

I have had the Dragon for about six months now, and find it is



good value for money. Unfortunately it all happens in dark black and white at the moment, as I am having technical difficulties with the interface to drive my Epsom colour TV from the Dragon's PAL monitor output.

A Hayden,  
Garsino,  
France

THE "INFORMATION for Machine Code Users" booklet is produced by Dragon Data and is available free from their Customer Support Department. The booklet contains a much more comprehensive memory map than the one in the additional information booklet as well as the addresses of several useful machine code routines. The disk-based and routines are not covered.

The Dragon's cartridge port connections are exactly the same as the Tandy Colour Computer's. All of the expected data, address and R/W lines are fed to this connector, together with several special purpose signals. It should be quite easy to connect your Epsom programmer with the necessary software to drive it. For the actual connection details, I suggest you get a

copy of the Colour Computer Technical Reference Manual which is only 85p from Tandy's.

The number socket on the Dragon gives simple composite RGB with sound, not true RGB colour — this may be the cause of some of your problems. The pin connections are as follows:

- Pin 1 — Video signal.
- Pin 2 — Ground.
- Pin 3 — Sound signal.
- Pin 4 — Blank (not used).
- Pin 5 — Blank (not used).

## Stringing spaces

I AM having a problem with one of the String functions for the Dragon. I am not sure whether it is my understanding, the manual or my computer which is at fault.

I am using STRNG to put number-like strings, the number is made into a string equivalent (right) but a space is included at the beginning of each string, eg:

10 AS = STRNG(1234)

20 PRINT AS:AS

This gives:

12 1234 1234 (17 being space of count)

There is no indication of this in the manual. The only mention of STRNG is on page 70.

This feature causes problems when you want to compare number strings, eg:

10 AS = STRNG(23) : BS = STRNG(30)

20 CS = AS + BS

30 PRINT CS

This gives:

1201130 and not

2030 as expected.

Can you give some guidance?

Chris Griffiths,  
Surrey,  
Luton

WHAT THE STRNG function actually does is to put the string of characters that would appear on the screen into a variable. When the Dragon prints a number it makes allowances for the minus sign, hence a space is left if the number is positive.

Provided you don't want to use negative numbers in your strings, the solution is to use AS = MID\$(STRNG(17), instead of just AS = STRNG(17). This will cut out the leading space, but will also cut out any minus signs.

## Looping folbles

AFTER executing the line FOR X = 1 TO 5 STEP 0.01 : NX: NEXT X: NX

the total error was almost 0.01.

Why has such a large error occurred when the loop is doing no processing except for printing out the loop count?

David Elliot,  
Aberdeen

YOU HAVEN'T discovered another error in the ROM, but you have raised an interesting point about the processing of a FOR-NEXT loop. Each time a NEXT statement is encountered, the relevant variable counter (in this case 'X') is incremented or decremented by the given value.

Only after this has been done does the Basic check whether the value is still within the boundaries given to continue the loop. Therefore, the value of a counter after a loop has been completed is always one step greater or lower than the given finishing value.

For example, if you try: FOR X = 0 TO 500 STEP 100:PRINT X: X the value printed will be 500, and not 500 as might be expected.

```
10 CLEAR200,30400
20 T=TIME:200=RAM+MEMO+250:
30 PRINT T=20:20
40 PRINT 20:20=1:20000:175:
50 NEXT T
60 -2:10000:1:17
70 PRINT 20:20=1:17
80 PRINT 20:20=1:17
90 -2:10000:1:17
100 PRINT 20:20=1:17
110 PRINT 20:20=1:17
120 PRINT 20:20=1:17
130 PRINT 20:20=1:17
140 PRINT 20:20=1:17
150 PRINT 20:20=1:17
160 PRINT 20:20=1:17
170 PRINT 20:20=1:17
180 PRINT 20:20=1:17
190 PRINT 20:20=1:17
200 PRINT 20:20=1:17
```

Disabling the LIST command

## Competition Corner

Answers to Competition Corner,  
Dragon User, 12/10 Little Newport  
Street, London WC2R 3LD

# Bring sprites to your Dragon

Gordon Lee provides the puzzle, Premier the prize

THE RECENT disclosure that a young American microcomputer enthusiast perfected a system which enabled him to win thousands of dollars at blackjack will have stirred up interest amongst micro-users generally. This is especially the case as the system was devised using only a standard personal mini, although this was later supplemented by the develop-

ment of an elaborate system of concealed portable radio transmitters and receivers, linked to a miniature computer strapped to the operator's body.

Of course, for a long time anybody with a "winning system" has usually found it a sure fire way of losing vast sums of money. This leads us to enquire if it really is possible to perfect a system that works,

especially if we have the aid of a micro-computer? Curiously, the game that is most commonly linked with so-called winning systems is the one in which the punter has the lesser chance of making a profit — namely roulette. The catch to the game of roulette is the 0/00 compartment on the wheel — the zero — which loses all bets to the house. This results in odds in favour of the house of  $2^{1/2}$ , a percent which means that, in the long run, the house will gain (and the punter lose) 26 pence for every £10.00 bet.

More usually, the punter with a system attempts to manipulate the amount bet rather than the outcome of the spin of the wheel, usually betting a higher amount following a loss, and a smaller amount after a win. Unfortunately all these systems fail in practice due to the additional rules regarding the highest and lowest bets allowable, and, of course, the punting is invariably at 2 percent plus.

There is, however, one casino game in which the odds, on certain occasions, actually favour the player. The game is blackjack, and it was this game that caught the attention of the American mentioned earlier. Blackjack is almost identical to pontoon, and requires the player to get a higher point count than the dealer, but without the hand's value exceeding 21.

## Prize

THIS MONTH'S prize is the new sprite graphics board from PremierMicrosystems. The board provides 256 by 192 resolution, 768 programmable graphics, 16 colours, and 32 fully misable screen display "layers" for building animated 3D effects. And the board also gives lower case letters, along with a clearer display.

## Rules

TO WIN the sprite board you have to send in the most elegant solution to the puzzle. You must show both the answer to the competition and how to solve it with the use of a Basic program developed on your Dragon. As a tie-breaker, complete the following sentence in 15 words or less: "I want to add a sprite

graphics board to my Dragon because

"Your entry must arrive at Dragon User by the last working day in March. The names of the winners, and the solution to the puzzle, will be published in our June issue. You may only enter the competition once. Entries will not be acknowledged and we cannot enter into correspondence on the result.

## Winner

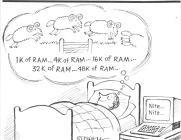
THE WINNER OF December's competition and recipient of a Dragon 64 from Dragon Data is R Bookman of Basingstoke. He correctly stated that the number of bicycles Santa should have written down was 1364866 — and suggested a heading management system as a Dragon 64 application.

## Advantage

The advantage to the player lies in the fact that the dealer has no option with regard to drawing further cards. If his count is 16 or less he must draw. If it is 17 or over he must stay. The player, on the other hand, has complete freedom of choice. But the greatest advantage to the player lies in the fact that at certain times, the player can have a higher than average chance of increasing his hand without exceeding a point value of 21. In practice, this means that every card dealt must be noted, and from this, by means of complex statistical formulae, it can be determined if conditions are favourable for the player at that point in the game.

Here is a form of roulette that won't be found in any casino. To play, draw a ring of numbers going clockwise from two to nine inclusive, with nine returning to two. Then choose a number between 100 and 200, and take this many chips. Now, enter the circle of numbers, beginning at number seven. If the number of chips in your hand is exactly divisible by seven then you must pay out  $1/7$ th of your chips. If it is not exactly divisible, then you pick up seven chips. This represents one move. You then move clockwise on to the next number, eight, and repeat the procedure — though this time if your chips are divisible by eight you pay  $1/8$ th, or if not, you pick up eight.

The object of the game is to continue round and round until the number of chips in your hand is exactly 100. Can you tell which number (or numbers) of chips you should choose to achieve 100 in the fewest possible moves?





**TIRED** of endless battles with ores?  
**CONFUSED** by interminable corridors and  
 Limitless caves?  
**BORED** by all the same old adventures?



# Try **The CRICKLEWOOD INCIDENT** and **Wings of War**

two new and different adventures from Salamander Software

In **WINGS OF WAR** you play Lt. Roger Wilson, reluctant hero. The time is November 1942 - you must penetrate into occupied France, disguised as a German Officer, infiltrate a secret army laboratory hidden in a chateau, steal the plans and the prototype of a new bomb, and make good your escape back to England.

**ROGER WILSON**  
 Star of Wings of War

In **THE CRICKLEWOOD INCIDENT** you, Arnold G. Blackthorn, the 19th heir to the Blackthorn fortune, find yourself tossed out of your mind and looking for something to do until the landrubble opens. There's nothing for it but to leave your padded cell and search the walls of London, Moscow, Hanoi and Nippon for the elusive Holy Grail. ROT for sheep of a sinister disposition.

**ARNOLD GASTY**  
 Star of the Cricklewood Incident

See description  
 by SALAMANDER

Stimulate yourself for only £295 each.

Please add 10p p&p to all orders. Send us \$4E for full catalogue.

Cheques or postal orders payable to:

# Salamander SOFTWARE

17 Mayfield Road, Brighton, BN1 2AA Telephone: Brighton (0273) 771942

Look for these other new releases from Salamander Software:

0000000

- 0001 (unpublished debut) £29.95

0002

- 0003 (original arcade action) £29.95

0004 (00000001) (Educational & Fun) £29.95

0005 (00000002)

- 0006 (00000003) (00000004) (00000005) £29.95

Now available are reviews of our best selling 16P Night Simulator for BBC disk and 00000000

# MICRODEAL

PRESENTS A PANTOMIME

## Cuthbert in *Boots*



On Cassette £8 each

Selected titles of MICRODEAL games available from larger branches of Boots